Attachment 1.02

Statement of Chief Operating Officer of Ausgrid (PUBLIC)

January 2015

Ausgrid revised regulatory proposal attachment

Statement of Trevor Armstrong

Chief Operating Officer – Ausgrid

I, Trevor Armstrong, Chief Operating Officer at Ausgrid, of Level 17, 570 George Street Sydney of the State of New South Wales, affirm:

Position

1. I am the Chief Operating Officer at Ausgrid. I report to Vince Graham, the Chief Executive Officer of Ausgrid. Ausgrid, Endeavour Energy and Essential Energy have common governance arrangements including a common Chief Executive Officer. Networks NSW is used to describe the operating model where Ausgrid, Endeavour Energy and Essential Energy work cooperatively to achieve efficiency benefits and other reform initiatives under these common governance arrangements.

2. As the Chief Operating Officer I am responsible for the day-to-day operations of Ausgrid. The fundamental objective of this role is to provide value to customers in a manner that does not compromise safety, network reliability or sustainability. My position description is attached as Annexure 1.

Educational background and professional experience in the energy sector

3. I joined Ausgrid (then known as Sydney County Council and subsequently as EnergyAustralia) as a cadet engineer in 1986. I have held various positions at EnergyAustralia / Ausgrid over the last 28 years, including in EnergyAustralia's service arm, Enerserve, where I worked in transmission construction, distribution planning and operations, and project management.

4. I hold an engineering degree from the University of Technology, Sydney. I am a Fellow of the Institute of Engineers and a Graduate of the Australian Institute of Company Directors. I also completed the Advanced Management Program at INSEAD in 2010.

5. Prior to being appointed as the Chief Operating Officer at Ausgrid on 1 July 2012, I held the position of Executive General Manager, Transmission & System Operations. This role covered asset management of the transmission network, system control, design and delivery of major capital projects and the engineering of the network.

6. Prior to my role as the Executive General Manager, Transmission & System Operations I held the position of Executive General Manager of the System Planning and Regulation Division. This division comprised: system planning; maintenance and replacement

planning; system control; regulation and pricing; major customer connections and metering; and policy and standards. The System Planning and Regulation Division, amongst other things, is responsible for the maintenance strategies for Ausgrid's network.

7. I am also a member of the Australia Energy Market Commission Reliability Panel.

8. My CV is attached in Annexure 2.

Background

9. This affidavit is made in support of Ausgrid's revised regulatory proposal. The Australian Energy Regulator (**AER**) has proposed, in its draft determination dated 27 November 2014, inter alia, real reductions in allowable capital expenditure (**capex**) of 42% and operational expenditure (**opex**) of 39% over the amounts proposed by Ausgrid in its substantive proposal.

10. In my opinion, based on current information, the reductions proposed by the AER would likely lead to substantial under investment by Ausgrid in both capital and operating expenditure, and would compromise the safety, the reliability and the ongoing sustainability of its network.

11. My opinion is based in part on my experience at Ausgrid (then known as EnergyAustralia) of similar regulatory reductions by the Independent Pricing & Regulatory Tribunal (IPART) in the 1990s. IPART recommended reductions in capex and opex by distribution network service providers (DNSPs), including Ausgrid.

12. In the period 1995 -1999 (The first regulatory determination period for NSW DNSPs) IPART allowed replacement expenditure (**repex**) averaging less than $20mpa or 0.5% of the then replacement cost of the network. In the period 1999 until 2004 the allowance of repex was increased to $40m pa or 1% of replacement cost. As assets typically have an average age of 50 years, not 100 to 200 years, this caused the assets on average to increase in age by approximately 2 years, even with the need to invest heavily in augmentation expenditure (**augex**) (expenditure in relation to augmenting or building new networks to increase aggregate capacity) due to the rapid increase in Air Conditioning systems being added to the system at the same time.

13. In addition, over time investment in the network has not been steady. Sydney grew rapidly in the 1960s and 1970s, following the need to stabilise the voltage for television in the late 1950s. Subsequently, Ausgrid proposed to IPART a repex plan of 2.4% of replacement cost. – 2% long term sustainable level and 0.4% a 'catch-up' element reflecting the low

repex for the prior 10 years. Regrettably, IPART reduced the repex program from 2.4% to 2% of replacement cost, a 17% reduction.

14. As a result of the level of allowances and reductions in repex, a backlog of replacement projects and a series of zone substation fires and explosions occurred from 1999 until 2004. The locations were Chatswood, Milperra, St Peters, North Sydney, Balgowah, Hunters Hill, Crows Nest and Paddington.

15. During the same time the available augex for long term management of the network was constrained due to the rapid growth in air conditioning load, particularly on the 11kV networks. This decreased reliability levels (in particular, it increased the restoration time after an outage). It is the 11kV network which contributes most to the service levels we provide our customers.

Ausgrid

16. Ausgrid is a New South Wales State Owned Corporation servicing 1.6 million homes and businesses throughout Sydney, the Hunter, and the Central Coast. Importantly, it serves key economic generating areas of the New South Wales including the Sydney Central Business District and the Hunter coal mines.

17. The principal assets of the network comprise approximately:

    (a) approximately 209 sub-transmission and zone substations, with associated control and protection systems;

    (b) approximately 469,000 poles;

    (c) approximately 30,000 distribution substations;

    (d) 40,000km of below and above ground electricity cables together with approximately 900,000 low voltage overhead house services;

    (e) 2,390,837 meters; and

    (f) 1,764 properties, comprising land and/or buildings.

18. The legislation framing Ausgrid's regulatory determination includes:

    - *Work Health and Safety Act 2011 (NSW);*
    - the National Electricity Law (**NEL**) and National Electricity Rules (**NER**), which provide for safe, reliable and efficient distribution services in the interest of consumers;
    - *Fair Work Act 2009 (Cth),* which binds Ausgrid as part to enterprise agreements; and

- a number of NSW electricity regulations, including *Electricity Supply (Safety and Network Management) Regulation 2014*, which impose standards for reliability, vegetation management and bushfire risk management.

- A range of environmental protection legislation including the NSW Protection of the Environment Operations Act 1997 and the NSW Contaminated Land Management Act, 1997.

Risk management in Ausgrid

19. Ausgrid has adopted a risk management framework based on ISO 31000:2009 - an international standard for risk management. This risk management framework provides that risks should be "as low as reasonably practicable" (**ALARP**). This refers to the level of risk that is tolerable and cannot be reduced further without the expenditure of cost, time and/or effort that is disproportionate to the benefit gained or where the solution is impractical to implement.

20. Under the framework, risks should be identified, analysed, evaluated and then treated. Risks are subject to ongoing monitoring and review. (See Company Procedure – Risk Management, section 5.3 attached as Annexure 3).

21. Under this framework Ausgrid recognises various categories of risk to its business, including safety risk (being the risk of fatality/serious injury of employee or member of public) and environmental risk (being the risk of a significant environment incident)..

Safety risk

22. Ausgrid recognises that there are inherent risks of operating electricity networks. The assets used to run an electricity network carry significant risk; when assets fail in service they can cause serious harm to customers, the community, Ausgrid's workers and the environment. For example, asset failure may cause fires, explosions, and electricity shocks.

23. Further, Ausgrid's customer base includes 20,600 customers who rely on life support technology. The National Energy Retail Rules recognise these customers as particularly vulnerable to loss of power and place strict controls on the circumstances in which life support customers' supply may be de-energised. In addition, Ausgrid has special obligations to ensure that life support customers are provided with information to assist them to prepare a plan of action in case of any unplanned interruption and are given written notice of any planned interruptions. Asset failure causing unexpected interruption to the supply of those customers places their safety at risk.

24. Ausgrid's objectives with respect to investment and expenditure on the operations of its business is also guided by the requirements of Chapter 6 of the National Electricity Rules, which define the capital and operating expenditure objectives, including to "maintain the safety of the distribution system."

25. Ausgrid considers that in order to comply with its regulatory obligations it is required to keep its assets in good order so that Ausgrid does not increase the risk of harm to the public or jeopardise the safety of its workers.

26. As a result, the first of Ausgrid's three core objectives in its current business plan is to "continuously improve safety performance with respect to our customers, staff and the public". The second and third objectives relate to maintaining reliability/sustainability of the network, and containing tariff rises to customers to below CPI.

27. Ausgrid's asset management plan (attached as Annexure 4) specifies seven outcomes which it considers will contribute to the achievement of those objectives. Those outcomes are stated as follows:

    (a) Assets added to our network are fit for purpose, the most economical choice on a life-cycle basis, and clearly specified.

    (b) Assets in service are monitored and maintained in accordance with properly developed maintenance plans.

    (c) Asset management plans are regularly reviewed using multi-factor risk assessment including safety, environmental, reliability and financial risks.

    (d) Maintenance practices are kept efficient by a review cycle that ensures continuous improvement.

    (e) The effective economic life of assets is maximised by using condition based decision making.

    (f) Performance and condition data is collected and recorded to enable future analysis in support of robust decision making

    (g) Asset disposal is recognised and managed as part of the replacement process.

28. Ausgrid considers that while all outcomes contribute in some way to the achievement of all the objectives, in relation to safety, outcomes (a), (b), (c) and (g) contribute comparatively more to the achievement of its safety objective.

29. Ausgrid has developed a number of diagnostic tools to monitor the health of its network assets, for example the age of assets, rates and history of failure, reasons for and consequences of failure.

30. Ausgrid has also developed activities in order to mitigate safety risks, including asset replacement plans and "Duty of Care" programs. The asset management principles are focused on ensuring that Ausgrid meets these obligations at least cost. An overview of Ausgrid's proposed replacement and Duty of Care plans is attached at Annexure 5.

31. Where asset failures can no longer safely be mitigated through maintenance, Ausgrid will consider replacement, refurbishment or modification of the asset. For example, an asset will be replaced where the asset fails in service, or where there is a risk of non-compliance with regulatory obligations by not keeping the asset in service, or if the failure of an asset may pose a safety risk which is deemed unacceptable.

32. Duty of Care programs include activities designed to address specified risks, including:

    (a) workplace safety (such as covering exposed electrical assets);

    (b) public safety (such the installation of anti-climb devices on towers and substation fencing);

    (c) fire mitigation (such as the installation of fire stopping and smoke detection systems); and

    (d) asbestos management (the removal of asbestos in cable pits, fire doors, etc). It should be noted that due to the history of the Ausgrid network, asbestos management is a substantial issue requiring both operational and capital expenditure which will be required for this regulatory period and many future periods.

33. A summary of the risky assets replaced and the Duty of Care programs undertaken by Ausgrid over the 2010-2014 period is contained from page 10 of Annexure 5 referred to above.

Environmental Risk

34. Ausgrid's environmental management system (**EMS**) adopts a holistic, integrated and risk based approach to managing its environmental program. Ausgrid's EMS is currently certified to the Australian and International Standard AS/NZS ISO 14001:2004, having demonstrated conformity with this standard by seeking external certification since 1996. (See Ausgrid Environmental Management System Manual EM 002 29 October 2013 attached as Annexure 6).

35. The EMS is a continual improvement process. In the EMS, Ausgrid first commits to an environmental policy, then uses its policy as a basis for establishing a plan, which sets objectives and targets for improving environmental performance. The next step is implementation. After that, Ausgrid evaluates its environmental performance to see whether the objectives and targets are being met. If targets are not being met, corrective action is taken.

36. The results of this evaluation are then reviewed by top management to see if the EMS is working. Ausgrid's management revisits the environmental policy and endorses new targets in a revised plan. Ausgrid then implements the revised plan. The cycle repeats, and continuous improvement occurs.

37. In summary, the EMS follows the repeating cycle of Plan, Do, Check and Act.

38. In particular in relation to environmental risk management, under the EMS, Ausgrid regularly undertakes risk reviews of aspects of Ausgrid. The information sources used during these reviews include Ausgrid annual report, organisational chart, applicable legal, permit, licence and other requirements to which Ausgrid subscribes, purchasing data, safe work method statements, safety data sheets, waste contract reports, incident and inspection debriefs and meetings with relevant stakeholders.

39. During each risk review, the suitability of each aspect within the risk assessment process is examined by confirming whether structural changes or changes to their activities have occurred since the last review. If a new activity, product and service is identified or where there is a material change to the aspect, these areas are considered for inclusion in the next program and assessed during the next risk review for their relevance in the process.

40. Results of these risk reviews are then incorporated into an integrated risk assessment database that is used to collate and analyse the data, identifying key aspects and impacts for the company. The process also provides traceable links between aspects, impacts and risk controls.

41. Each aspect of Ausgrid will be reviewed at least every two years and those areas with higher risks will be assessed annually. The assessment frequency for each area is recorded in EMShare. The risk reviews are recorded using a real-time form called an environmental risk record.

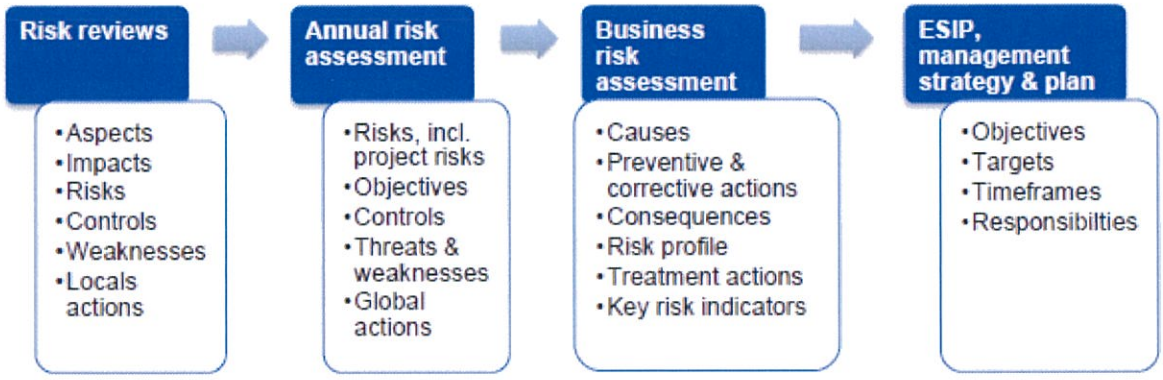
42. Once the aspects are confirmed, Ausgrid quantifies the level of the risks (and hence the significance of the environmental impact) by risk analysis using information from Quality Action Requests, Work Improvement Notices, incidents and inspections relevant to the aspects.

43. Ausgrid then collates the risk reviews and assess any global legal changes and trends of incidences, inspections and Quality Action Requests using the EMShare.

44. The annual environmental risk assessment information is fed into Ausgrid's annual business risk assessment program to set objectives, identify areas for improvement and determine controls necessary to mitigate that risk.

45. If any weakness or improvement is identified during the risk assessment, Ausgrid develops and prioritises treatment actions to address those issues and collate those into Ausgrid's risk management plan. This feeds into Ausgrid's annual environmental management program called ESIP.

46. An overview of Ausgrid's Environmental risk assessment process is set out as follows.



Ausgrid's regulatory proposal

47. Ausgrid's regulatory proposal set out a forecast amount of $2.8 billion ($2013/14) for operating expenditure for the 2014/19 period.

48. At the time the operating expenditure forecast was developed, Ausgrid management considered that this amount was required in order to achieve the operating expenditure objectives set out in the National Electricity Rules, being: (a) to meet or manage the expected demand for standard control services over the period; (b) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services; and (c) maintain the safety of the distribution system through the supply of standard control services.

49. Ausgrid management also believed that the forecast operating expenditure amount reasonably reflected the operating expenditure criteria in the National Electricity Rules, being: (a) the efficient costs of achieving the operating expenditure objectives; (b) the costs that a prudent operator would require to achieve the operating expenditure objectives; and

(c) a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives.

50. Of the total operating expenditure forecast amount of $2.8 billion; $1.26 billion was forecast for maintenance; $1.54 billion was forecast for operations and support; and $37 million was forecast for "other," representing demand management initiatives.

51. The initial regulatory proposal (p 52) sets out a summary table of the forecast methods that Ausgrid adopted for each of the operating expenditure cost categories, which is replicated below in Table 1. The forecast methodology was also submitted to the AER as required under the Rules in November 2013. The opex was based on the cost allocation method also approved by the AER.

Table 1 – Summary of forecast methods in Ausgrid IRP

Group	Cost category	Base year	Base year variation by volume	Base year historical averaging	Bottom up	'Top down' approach	Other
Maintenance	Inspection – vegetation management	✓					
	Inspection – all other costs		✓				
	Corrective	✓					
	Breakdown	✓					
	Nature induced breakdown			✓			
	Non-direct maintenance	✓					
	Engineering support	✓					
Operation and support		Either base year or bottom up or combination thereof.					
Other opex	Cost savings / productivity improvement					✓	
	Non network alternative programs				✓[1]		
	Debt raising cost						✓ i.e. AER's method

52. As can be seen from the table, the operating expenditure group "Maintenance" includes the cost categories of: Inspection - vegetation management; Inspection - all other costs; Corrective; Breakdown; Nature induced breakdown; Non-direct maintenance; and Engineering support.

[1] A small component of this cost will be forecasted using the base year approach

53. With the exception of two cost categories in the Maintenance Group, "Inspection - all other costs" and "Nature induced breakdown", all cost categories in the Maintenance group are forecast using a base year approach.

54. The base year approach is one where the current actual cost (in this case, the actual cost from 2012/13) associated with these activities is taken and adjusted to account for future changes in Ausgrid's circumstances, operating environment, regulatory obligations, and changes in demand and cost inputs.

55. Actual total operating expenditure on maintenance activities in 2012/13 was $235.4 million. That is, in 2012/13 it actually cost Ausgrid $235.4 million to undertake these maintenance activities. See Table 2 below for a breakdown of this total by cost element.

Table 2 - Percentage of program expenditure by cost element

Program	Labour	Materials	Contracted Services	Other
Planned Maintenance	44%	3%	43%	11%
Corrective Maintenance	62%	7%	19%	12%
Breakdown Maintenance	65%	6%	12%	16%
Nature Induced Maintenance	76%	2%	4%	19%
Total Maintenance	**56%**	**5%**	**27%**	**13%**
Replacement	44%	20%	22%	13%
Duty of Care	35%	12%	42%	11%
HV & LV Capacity	34%	17%	34%	15%
Cust Conns & Services	39%	34%	16%	12%
Public Lighting	39%	21%	24%	16%
Area Plans	21%	20%	52%	7%
Total Capital	**31%**	**19%**	**37%**	**12%**

AER draft determination

56. The AER's draft determination provides a total operating expenditure allowance of $1.7 billion ($2013/14). This equates to the following allowance for operating expenditure in each year of the regulatory control period relative to the forecasts in Ausgrid's regulatory proposal:

$M	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Ausgrid's proposal	565.1	566.2	574.2	568.9	568.4	2842.9
AER draft decision	337.5	342.2	349.8	343.2	349.2	1721.9
Difference	-227.6	-224.0	-224.5	-225.7	-219.2	-1120.9

57. In 2014-15 to date, Ausgrid has been operating in accordance with the expenditure allowance in the transitional revenue determination, which exceeds the expenditure allowance for 2014-15 in the AER draft determination.

Areas of expenditure and operations

58. Ausgrid's expenditure in relation to its electricity distribution business compromises two categories of expenditure, capex and opex.

Capex

59. Ausgrid's assets fall into two categories: network assets and non-network assets.

Network assets

60. Network assets are assets that form part of the electricity distribution network. The main types of network assets are:

(a) Poles;

(b) Columns (used for structural support of public lighting services);

(c) Cables (both overhead, also referred to as "conductors", and underground);

(d) Substations, principally comprised of transformers and switchgears;

(e) Protection equipment;

(f) Control equipment; and

(g) Meters.

61. Ausgrid's capex on network assets consists of four sub-categories of expenditure:

(a) Augmentation expenditure in relation to augmenting or building new networks to increase aggregate capacity;

(b) Replacement expenditure, in relation to replacing components in the existing network;

(c) Compliance expenditure, in relation to compliance obligations; and

(d) Connections expenditure, in relation to work on existing network to enable supply of electricity.

62. Ausgrid determines the life of the assets on the basis of the Valuation of Electricity Network Assets - A Policy Guideline for New South Wales Distribution Network Service Providers issued by the New South Wales Treasury (the **Policy Guideline**). A copy of this document is attached as Annexure 7. Ausgrid also assesses asset life based on condition based monitoring and asset inspections.

63. It should be noted that, relative to the Victorian and South Australian DNSPs, Ausgrid (on the basis of percentage of assets greater than mean economic life) is the oldest network in that group. The AER's analysis of the relative age of assets, assessed by the proportion of assets greater than 50 years old demonstrates that the Ausgrid assets are the second only to the South Australian Power Networks assets in age. The age of the SAPN assets is somewhat skewed however, due to the long life assigned to a particular asset (the Stobie poles) in its response to RIN. While age is not the determinative factor for repex and opex requirements, it does influence the overall level expenditure required to manage the network over the long term, relative to those networks with younger assets due to technological advancements in equipment and longer remaining life.

Poles

64. Ausgrid's network has more than 469,000 poles. More than 90% of the poles are wooden poles including wooden poles staked. The remainder of Ausgrid's poles are concrete poles and steel poles.

65. The accepted standard life of wooden poles is 45 years with a maximum potential life of 50 years (see page 53 of the Policy Guideline). Ausgrid has some of the oldest pole support structures in Australia with a number of the regal species timber poles being over 80 years old. As at 30 June 2014, 34.87% of Ausgrid's wooden poles were over the standard life (see Table 6 at page 9 of the Asset Condition & Planning Summary – ACAPS4001 Poles, attached as Annexure 8).

66. There are two types of pole failures – self failure (eg poles become fragile overtime and fall because of gravity) or failures induced by external factors (eg collisions caused by cars).

67. Pole failures cause safety and reliability issues. Therefore, Ausgrid has taken measures to address pole failures both before they occur (preventative measures) and after they have occurred (corrective measures).

68. An example of a preventative measure is the pole inspection regime. Every pole in Ausgrid's network is inspected every five years. Poles are inspected systematically in a street by street, suburb by suburb manner to ensure that this five yearly inspection is undertaken efficiently. As a result of this inspection program, Ausgrid is informed about each pole's condition and any replacement requirements. The inspection of wooden poles involves digging about 350-400 mm into the ground, drilling a hole in the pole at around 100mm below ground and taking measurement of the wall thickness. Wall thickness is a measure of the remaining good wood after allowance has been made for internal defects and any rotten or defective external timber. If the wall becomes too thin, the strength of the pole is compromised and the pole is likely to fall. By comparison, the inspection for concrete or steel poles is primarily a visual check, although some excavation may be conducted in certain circumstances (for example, if damage is observed).

69. Depending on the result of the inspection, different actions may be taken regarding the wooden poles. These actions may include:

(a) Applying chemicals to the pole to avoid external factors (eg insects or fungus) affecting the life of the wooden poles. This is done by contractors at the time of inspection. Pole preservatives (boron and fluoride rods and wraps) are applied to all poles at the time of inspection, with the exception of newly installed non-Blackbutt species CCA treated poles, which are routinely treated 15 years after installation. In addition, Ausgrid applies treatment for termites and heartrot based on the inspection results; or

(b) Replacing the pole. The pole will be replaced if its condition requires so (eg severe bottom rotting); or

(c) Strengthening the pole. This involves driving steel reinforcement to the bottom of the pole to support the pole if this will be able to extend the usable life of the pole. This process is often described as "staking" a pole. Ausgrid estimates that approximately 23,000 poles to date have been strengthened by staking. The reason the remainder of poles are not staked is that staking is not always feasible and may not always extend a pole's usable life. Where staking is successfully done, it usually extends the life of a pole by approximately 10-15 years.

70. Ausgrid uses a procedure (Ausgrid Network Standard – NS 145 Inspection and Treatment Procedures, attached as Annexure 9) for pole inspection and requires contractors to

manage and report on their work using Ausgrid's Mobile Asset management System devices which once synchronised downloads the completed pole inspection notifications into the SAP system.

71. The optimal time of the inspection has been determined using the Failure Modes Effects Criticality Analysis process and assesses costs versus failure modes and outcomes.

72. Ausgrid has a very low tolerance of pole failures because of the higher density of customers within the area it covers. Ausgrid has many poles along major roads in Sydney. If a pole was to fail, there is a high probability it may injure individuals, as well as causing a traffic disruption. The potential ramifications of pole failure are summarised in Table 3 below (refer to page 24 of the Asset Condition & Planning Summary, Annexure 8 above)

Table 3 – Consequences of Pole Failure

Pole failure	Hazard	Likelihood	Consequence	Risk
Catastrophic failure of the pole due to rot, termites or other driver	Electric shock leading to injury, electrocution/fatality of Ausgrid employee or member of the general public due to fallen conductors(Note:1)	Unlikely	Catastrophic	D5
Catastrophic failure of the pole due to rot, termites or other driver	Bushfire risk caused from fallen assets	Unlikely	Catastrophic	D5
Catastrophic failure of the pole due to rot, termites or other driver	Mechanical Impact (Note:1)	Unlikely	Major	D4
Failure of the pole due to rot, termites or other driver	Mechanical Impact, electrical hazard and fire risk (Note:3)	Possible	Moderate	C3
Failure of the nail	Mechanical impact and electrical hazard	Unlikely	Minor	D2

73. Ausgrid considers that the inspection regime is able to identify 99% of potential safety issues with wooden poles. Ausgrid's pole failure rate in recent years has been approximately one failure per 56,000 poles per year. The consequence of failure cost, as per the Risk Quantification Model, has been evaluated at $474,820.00 (refer to page 27 of the Asset Condition & Planning Summary, Annexure 8 above).

74. Almost 100% of the inspection regime has been sourced from external contractors. These contractors are selected through an open tender process in accordance with Ausgrid policies. Ausgrid's procurement policy and process manual are attached as Annexure 10.

75. A second preventative measure is Ausgrid's Blackspot Program. This program involves Ausgrid obtaining data from New South Wales Roads and Maritime Services (**RMS**) regarding motor vehicle incidents (eg collision with poles). Ausgrid studies the data and allocates the poles that are more frequently or likely to be driven into to another location. Approximately five to 10 poles are reallocated each year as a result of this program. A letter from RMS to Networks NSW regarding the program is attached as Annexure 11.

76. In a very limited set of circumstances poles will fail despite the inspection regime undertaken by Ausgrid. Poles may also fail, for example, due to a heavy storm or because of a motor vehicle accident involving the pole. The main corrective measure is replacing the pole after an actual failure occurs.

77. Of all pole replacements approximately 20% is outsourced via a competitive process. As part of the development of the Asset Condition & Planning Summary document, a review of internal and external delivery costs associated with pole replacement and staking was undertaken. The review provided an informed view in the development of efficient unit rates, that were then used as part of the submission.

78. A break-down of poles currently in commission and the number of poles replaced in recent years are set out in Table 4 below. Ausgrid considers that the number or pole replacements required in the next regulatory period will be of a similar magnitude. (The number of total replacements was required to be apportioned between particular designated categories for the purpose of responding to the RINs, and consequently are not in whole numbers).

Table 4 - Break-down of poles in commission and number of poles replaced

Total poles by: Feeder type	Currently in commission	Replaced in 2008/09	Replaced in 2009/10	Replaced in 2010/11	Replaced in 2011/12	Replaced in 2012/13
Total CBD poles	507.00	1.93	4.09	4.15	4.19	3.49
Total urban poles	360055.00	1287.57	2727.61	2769.96	2793.54	2331.60
Total rural long poles	7904.00	30.08	63.73	64.72	65.27	54.48
Total rural short poles	111643.00	428.13	900.19	926.21	925.40	769.98

Columns

79. There are approximately 49,000 columns in Ausgrid. These columns are generally used to provide a structure support to public lighting services.

80. Bulk replacement of public light bulbs takes place every three years. In bulk replacement all bulbs are replaced, whether or not they are faulty. There are two drivers for bulk replacement:

(a) reducing the number of ad hoc replacements as ad hoc replacements are expensive to undertake when compared with bulk replacement over time; and

(b) to comply with the quantity of light standard in the Public Lighting Code, as the volume of light generated from a bulb reduces over time.

81. Bulk replacement is contracted out. The same procurement policies and tender processes apply to contracting out of bulb replacement as referred to at paragraph 74 above.

Cables

82. There are two types of cables:

(a) underground, representing approximately 45% of the network; and

(b) overhead, representing approximately 55% of the network (overhead cables are also referred to as conductors).

83. There are a variety of risks associated with cable failures. The main risk associated with overhead cables is a failed conductor dropping onto the ground "alive". This may start a bushfire or cause electric shocks to individuals.

84. The second major risk arises in relation to oil filled cables. It is possible that oil may leak from the cables, polluting the environment as a result of failure or third party damage. For example, from 1999 until 2004 Ausgrid experienced oil leaks from its cables on average of 3000 litres per month. As a result of the environmental consequences Ausgrid (then EnergyAustralia) had a meeting with the New South Wales Environment Protection Authority on 29 October 2002 to discuss specific requirements in relation to managing oil leakage related issues. A copy of the draft notes from the meeting is attached as Annexure 12. Ausgrid developed the Oil filled cable equipment strategy developed with the Environmental Protection Agency, under which it agreed to replace 132kV oil feeders over a period of time to reduce the likelihood of oil damaging the environment. The oil filled cable equipment strategy developed and maintained in consultation with the EPA is attached as Annexure 13.

85. Ausgrid has taken the approach to allow underground low voltage cables to operate until they fail as long as there is no imminent risk to safety. This is factored into the capex in relation to cables.

86. Ausgrid conducts inspections of overhead conductors and their structures at the midpoint of the five year cycle of pole inspections referred to above in paragraph 68. This staggering of inspection cycles ensures that each pole is sighted every two and a half years so that any necessary treatments or visible issues with the pole can be identified.

87. Conductors are replaced:

(a) ad hoc, when they actually fail; or

(b) if they belong to a class of cables which are known to pose safety or environmental issues (eg a class of cables that have common safety issues and are from a particular cable manufacturer).

88. An example of a class of cables known to posed safety issues is Consac LV cables which have deteriorated faster than similar cables of other brands. Another example is the steel wire overhead conductor program. When the steel wire fails it has the potential to result in an increased risk of bushfire This program replaces steel wire in bushfire prone regions, such as the Hunter region.

89. An example of cables which may pose environmental risks are Ausgrid's "oil filled cables". Ausgrid has approximately 420 kms of cables which are "paper insulated fluid filled", also known as self-contained fluid filled cables. This represents approximately 4% of Ausgrid's underground network. The function of the cable fluid is to improve performance of the cable by filling voids present in the paper insulation and so avoiding cable breakdown. The cables were installed mainly in the 1950s through to 1970s.

90. As a result of being buried in the ground, these cables are subject to environmental and mechanical stresses as well as the electrical stresses they experience through normal operation as part of the electricity network. Where these stresses result in damage of the metal sheath containing the insulating fluid it is possible that this fluid can leak into the ground, either from continuous small leaks or infrequent catastrophic leaks, which requires prompt excavation and repair.

91. Ausgrid is required to report to the EPA any leaks greater than 5 litres per day. During 2013/14, 11 cable leaks triggered this threshold and Ausgrid is currently being investigated by the EPA for one of the most recent leaks that occurred in December 2014, where cable fluid entered a nearby creek.

92. The fluid filled cables are in continuous use and are an essential part of Ausgrid's supply network, and therefore cannot routinely be taken out of service except for brief periods necessitated by the need for maintenance and repair. Minimising the environmental risk associated with the operation, maintenance and repair of fluid filled cables is an important environmental priority for Ausgrid.

Substations

93. Substations are where voltage of the electricity is transformed to prepare for long distance transmission, or transformed to a lower voltage for distribution.

94. The major components of substations are transformers and switch gears.

95. Transformers are inspected every one to six years (subject to different types of transformers) and are done in-house. Distribution transformers have a life of 45 years and are replaced rather than being fixed if they fail, because the cost of replacement is usually lower than the cost of repair and refurbishment, relative to the life gained via a mid-term investment.

96. The switch gear is also inspected every one to six years, depending on the type of switch gear. By way of example, some high voltage switch gear is inspected every three years. The inspection involves:

    (a) for oil circuit breakers, collecting oil samples and analysing the oil samples to check the veracity; and

    (b) for electronic circuit breakers, conducting functionality tests on them.

97. Switch gear is replaced when it fails, when it is approaching the end of its life or belongs to a class of equipment that have shown common safety issues. By way of example:

    (c) Ausgrid has many 11kV switch boards (deployed many years ago) which require replacement as that technology is now obsolete; and has the risk of causing a wide spread outage for an extended period of time.

    (d) A class of 132kV switch gear has been identified as having common safety issues and is being replaced.

98. Ausgrid is reluctant to outsource the inspection and maintenance of zone substations and sub-transmission substations to external service providers primarily due to safety concerns and the critical nature of the supply arrangements. I note that in 2010 there was a TransGrid fatality at their Sydney East substation when a contractor was killed due to unfamiliarity with the technical operation and safety requirements at their site.

Protection equipment

99. Protection equipment refers to technology which monitors power loads in the network, and sends a signal to a switch which may cut or re-route the power to address any problems

(for example, in the event that a piece of equipment fails and creates fault conditions which result in excessive fault currents).

100. There are many different types of protection equipment. The protection equipment on the low voltage network is typically a fuse, which in the event of a fault acts to break the circuit. The protection equipment at zone substations is usually more complex utilising electronic equipment.

101. An equipment monitor is used to monitor the system. Ausgrid conducts functional checks, on different inspection cycles ranging from one year to six years. Some protection equipment may be checked every year, eg protection equipment around a nuclear reactor, hospitals or air force base, or equipment that is known to be less reliable.

102. During the inspection, Ausgrid will check whether every part of the system is functioning normally. The inspection is conducted by internal staff, rather than being outsourced, due to the highly specialised expertise required.

103. Protection equipment is replaced on condition, ie it is replaced when it fails or shows signs of decreased reliability. The expected life of Ausgrid's protection equipment is 25 years. However, this has been decreasing as more advanced electronic protection equipment is introduced. The additional electronics in this protection equipment has resulted in it having a shorter life span.

Control equipment

104. Control equipment (known as supervisory control and data acquisition system, SCADA) is an electronic / computerised system. Ausgrid has two control rooms (one in Sydney and one in Newcastle).

105. Some parts of the control system of Ausgrid were deployed many years ago and are becoming harder to maintain (eg due to limited availability of replacement parts and unavailability of relevant expertise and experience in the market place). Ausgrid takes two measures to deal with this issue, depending on size and scalability:

- to deploy new control systems and retire the old system; or
- to organically replace components in the old system with modern technology components. This requires deep knowledge of both the old system and new components.

106. Both of these measures have limitations due to reliability and safety considerations, and there is a limited rate at which these measures can be employed.

107. The testing, inspection and replacement of control equipment is performed by Ausgrid employees. The frequency of testing and/or inspection of the control equipment ranges from one month to three years, depending on the criticality of the equipment. The control equipment constantly feeds back information regarding its condition to the control room, including sending signals if it becomes less stable or faulty. The equipment is replaced based on condition.

Meters

108. Ausgrid owns most of the meters in its network. The meters are replaced based on condition, ie they either fail or belong to a class of metres that are inaccurate or unsafe.

109. Ausgrid conducts sample testing of meters under metrology rules (in the Metrology Procedure: Part B: Metering Data Validation, Substitution and Estimation Procedure for Metering Types 1 – 7) to test the accuracy of meters and then make decisions as to whether replacement of meters will be required. The testing and replacement of meters are conducted by Ausgrid employees. Meters must comply with the testing regime as approved by AEMO. Meter reading and connecting/disconnecting meters to customers are all outsourced. The same open tender processes apply to the outsourcing of meter reading services as described in paragraph 74 above.

Non-network assets

Property

110. Ausgrid operates 31 depots. Depots are typically owned rather than leased by Ausgrid. Ausgrid has consolidated some depots (eg Chatswood and Zetland) to be more cost efficient. Ausgrid needs to maintain a certain number of depots to ensure the coverage its network, including to avoid long response times for planned or emergency situations, reduce risks to the public and avoid reducing its service levels generally.

Fleet

111. Ausgrid has 2,732 fleet vehicles, which comprises 869 leased vehicles (31.8%); 1148 light commercial owned vehicles and 715 heavy owned vehicles. Large commercial vehicles and heavy fleet are owned by Ausgrid, as they are specially designed and used when performing work on the network. These include elevated work platforms, which lift staff up to perform work on poles or overhead cables, borers which hold poles for pole replacement or fixing, jinkers that carry poles and specially designed trailer trucks.

Computer hardware and software

112. A quarter of the IT spend is on outsourced services (27%). These services include data centre facilities, management of servers, hardware maintenance and some application support services. Software licensing, telecommunication services and hardware leasing account for another 35% of the total IT spend. The software, telecommunications and leasing are critical to support the running of the electricity network and maintaining the network assets. The remaining IT spend relates to the operational management of ICT applications and vendors to maintain the technical currency, scalability and capacity of existing ICT systems and assets in a prudent and efficient manner reducing the risk of potential failure and/or unplanned production outages to critical business processes.

Opex

113. Ausgrid, in its Initial Regulatory Proposal dated 30 May 2014 (**IRP**), determined an opex requirement based upon the opex needed to maintain the safety and reliability of its network assets and the operation of the network. Ausgrid grouped its opex into the following categories: maintenance, operation and support, and other opex (referring to demand management costs).

114. As set out in Table 1 above, for each group and cost category, Ausgrid adopted a fit for purpose approach to forecasting its opex. The approach included the following methods:

(a) Base year method: the current actual cost adjusted to account for future changes in Ausgrid's circumstances, operating environment, regulatory obligations and changes in demand and cost inputs. This method was used to forecast to forecast the majority of Ausgrid's operational costs.

(b) Base year by variation of volume: is the base year method adjusted for a prediction of volume of tasks that varies from the base year volume, and is used to forecast system maintenance inspection opex.

(c) Base year historical method: this involves taking a historical average of the costs (in $2013/14) captured during the first four years of the 2009-14 regulatory period and substituting the average for the base year actual opex. It was used to forecast nature induced breakdown costs.

(d) Bottom up method: this method derives the total forecast opex by taking into account all the inputs and factors relevant to the activities being performed (for example, number of tasks, the cost types required to perform each task such as labour and materials and the price of these cost inputs).

(e) Top down approach: this involves a modelling approach to estimate future capex based on 'fit for purpose' considerations such as historical expenditure, and future drivers including changes in the number of connections.

(f) The method as adopted by the AER in respect of debt raising costs.

115. Following the AER's Draft Determination dated 27 November 2014, Ausgrid revised the opex requirements for its Revised Regulatory Proposal (**RRP**) in the following manner:

(a) Updated the 2014/19 forecast opex requirements to consider the outcomes of the 2013/14 audited regulatory accounts;

(b) Updated the 2014/19 forecast opex requirements to include updated forecast of ongoing workforce requirements based on current levels and included progressive improvements in labour productivity;

(c) Updated the redundancy costs associated with the progressive reduction in our forecast workforce requirements, which are required to be paid as a regulatory obligation imposed by an enterprise agreement certified by the Fair Work Commission in accordance with the Fair Work Act;

(d) Proportionally reduced our non-labour operating costs for efficiency and labour productivity improvement opportunities; and

(e) Reflected updated labour cost escalation in line with the AER's draft determination.

116. I set out below further details of Ausgrid's opex. The two main classes of Ausgrid's opex are vegetation management costs and labour costs.

Vegetation Management

117. Vegetation management is 95% outsourced to external suppliers (the internal cost is confined to contract management). Ausgrid has developed the Technical Documentation – Vegetation Management Services (attached as Annexure 14) as the specification for managing contractors. The contracts are performance based. Some of the requirements for contractors are in the Annexures of this document:

- Appendix E Training Matrix, which sets out training that contractors' operators are required to have for various tasks;
- Appendix H Key Performance Indicators, which shows that the contracts are performance based and sets out the key indicators for measuring performance;

- Appendix K, Vegetation Management Common Requirement (VMCR) (the current version, v7.4). The VMCR is the minimum performance standard that the contractors must comply with when performing their contracts regarding vegetation management. The VMCR is generally based on ISSC 3 Guideline for Managing Vegetation Near Power Lines (attached as Annexure 15) with some additions and amendments to better manage risk. Contractors that do not perform to the standard are replaced;

- Appendix J, Exceptions table, which sets out times when there are exceptions to the minimum vegetation management clearing requirements. The exceptions are typically variances out of practicality concerns, which may involve less cutting than the minimum vegetation clearing requirements in certain cases, or more cutting than those requirements in certain cases (and whether or not a discretionary rate would be paid to contractors for additional cutting);

118. Vegetation management contracts are long terms contracts, usually 3 year terms with an option to renew for another one year. The tendering and outsourcing of vegetation management has been in place for approximately 8 or 9 years.

119. More generally, Ausgrid has developed a Tree Safety Management Plan (Draft) as required by the Electricity Supply (Safety and Network Management) Regulation 2014 which provides for Ausgrid to:

- minimise the possibility of accidental electrocution;

- minimise environmental harm, including minimising damage or destruction of vegetation;

- reduce the risk of fires caused by electricity; and

- prevent destruction, damage or interference with Ausgrid's Network and as a result, reduce the risk of power interruptions to the community.

120. A copy of this plan is attached as Annexure 16.

Labour

121. Ausgrid's total head count (including labour hire) is around 5,368 as at 31 December 2014. This figure excludes 30 employees who are employed by Ausgrid but in effect perform work for Network NSW (therefore Ausgrid bears only a proportion of their cost). The break-down of head count by division is as follows in Table 5.

Table 5 – Ausgrid headcount by division

Division	Head count
Chief Engineering	470
Finance and Compliance	319
Health, Safety and Environment	86
Information, Communication and Technology	277
Network Development	615
Network Operations	2756
People and Services[2]	845
Total	**5,368**

122. Staff in Network Operations division perform various tasks, including physical maintenance, certifying and inspecting, and customer care (such as new connections and connecting power during outages). They can be divided into the following groups:

- 3 regional groups, by geography: North (above central cost); South (south of Sydney Harbour) and Central (in between north and south). These staff work on the distribution network (poles, wires, substations).
- Transmission group: this is based in the Sydney basin but operates across entire network area, performing work exclusively on transmission assets.
- Network connections group: this group manages the customer/connection process and staff include installation inspectors and contestability (Accredited Service Provider) inspectors. These staff inspect and certify new connections, which usually involve the customer paying an external contractor to perform the connection. This group also comprises some back office staff and designers.
- System control: this group manages the control and switching of the entire network. It comprises staff working in two control rooms, as well as field staff, engineering staff, and emergency service operatives.
- Operational performance group: this group conducts performance reporting, acts as an interface between network development and network operations (ie in ascertaining requirements for maintenance), and incorporates administration staff for the broader network operations division.

[2] Includes apprentices, consistent with AER reporting requirement.

123. Field staff (ie staff that perform tasks near or in relation to the network) need to meet certain qualifications before they can operate near the network. Generally the qualification of field staff will fall into one of three categories and they perform different duties in accordance with their qualifications:

- **Substation technicians** have an electro technology qualification. The largest number of staff have this qualification. There are several strands of substation technician with differing levels of training in addition to the common base qualification (eg roles range from substation technician in regional groups, through to working in the protection area, or field operators that do switching).

- **Line workers** perform work on the overhead network. Line workers in the transmission group work on transmission assets while those in the regional groups work on distribution assets.

- **Cable jointers** perform work on the underground network, as well as termination of cables in substations, in both transmission and distribution regional groups. Transmission cable jointers are specifically trained to work on transmission assets.

Employment policies and agreements

124. Ausgrid has an Enterprise Agreement, attached as Annexure 17.

125. This Enterprise Agreement has recently passed its nominal expiry date. A new enterprise agreement is currently being negotiated between Ausgrid and the unions. The unions have rejected Ausgrid's offer made on 26 November 2014.

126. Ausgrid is offering a two or three year agreement with a continuation of no forced redundancy for the life of the agreement. The main terms of the offer are:

(a) up to 2.5% salary increase per annum, for a number of competitiveness initiatives, including:

(i) aligning long service leave to the industry standard;

(ii) limiting the scope of the Qualified Supervisor Electrical Work Allowance;

(iii) reducing the benefits offered under the Overtime and On Call Arrangements; and

(iv) revising the salary maintenance policy and an associated redundancy and redeployment memorandum of understanding.

(b) 0.4% increase per annum for the equity initiatives as a package, including:

(i) Freezing Electrical Safety Rules Allowances at the current rate;

(ii) Ceasing the Qualified Supervisor Electrical Work Allowance;

(iii) Equalising the superannuation top-up. This relates to employees who are in the Defined Benefit Superannuation Scheme, governed by Energy Industries Superannuation Scheme Trust Deed (Consolidation as at 20 August 2011) (attached as Annexure 18);

(iv) Reducing minimum payment for callout and planned overtime from 4 hours to 2 hours;

(v) Consolidating a number of miscellaneous allowances; and

(vi) Removing the current performance bonus available to Professionals, Managers and Specialists based on the achievement of predetermined performance targets.

(c) Modernising certain agreement clauses contained within the current agreement.

127. The slides for the presentation to the unions summarising the offer and a copy of the revised enterprise agreement as proposed by Ausgrid are attached as Annexure 19.

128. As the new enterprise agreement is still being negotiated and the conditional offer has been rejected by the unions without making any counter offers, the current agreement continues in force and it is impossible to predict with accuracy the terms of the new enterprise agreement that will be entered into.

Requirements of operation in NSW

129. The key (electricity) legislative and licence conditions/obligations binding Ausgrid in its operations are set out as follows:

(i) Electricity Supply Act 1995;

(ii) Electricity (Consumer Safety) Regulation 2006;

(iii) Electricity Supply (Corrosion Protection) Regulation 2014;

(iv) Electricity Supply (General) Regulation 2014;

(v) Electricity Supply (Safety and Network Management) Regulation 2014;

(vi) Market Operations Rule (NSW Electricity Business to Business Procedures) No 1 Of 2013

(vii) Ministerially imposed licence conditions for Distribution Network Service Providers:

(A) Conditions 1 to 13; and

(B) Conditions 14 – 19.

130. A more comprehensive list of legislations and regulations that Ausgrid must comply with is attached as Annexure 20 "Company Procedure - Legislative Register" and "Environmental guidelines".

131. Ausgrid may also be subject to specific requirements imposed by regulators. For example, Ausgrid (then EnergyAustralia) developed a strategy to reduce the environmental risk poses by oil filled cables in conjunction with the AER (discussed in paragraph 84 above).

Steps taken to increase efficiency and reduce costs

132. In April 2012 the NSW Government established the Network Reform Program, a restructure of the three NSW DNSPs with the objective of continuously improving safety performance, maintaining network reliability and striving to contain average increases in our share of customers' electricity bills at or below the Consumer Price Index (CPI). That restructure commenced on 1 July 2012.

133. Under these programs Ausgrid targeted significant cost savings over the period 2012-16 compared to the projection in the 2011 Statement of Corporate Intent. From July 2012 Ausgrid commenced implementation of the Network Reform Program covering four main areas:

(a) The operating model program is continuing to be implemented across Ausgrid. This program involved the implementation of new organisational structure and processes. Ausgrid reviewed the functions and activities of each division of the organisation and developed strategy to minimise the structure of the division, where possible. As at June 2014 Ausgrid had reduced staff numbers by 465 as a result of this program generating a recurring benefit of approximately $50m and incurring redundancy cost of $31m.

(b) Capex reductions have been gained through the implementation of planning reviews and revised governance and risk management frameworks, such as the CASH methodology. The changing management structure and the impact of customer

demand on the need for growth assets drove Ausgrid to undertake a significant review of its projected capital expenditure. This review aligned with the introduction of a revision to Ausgrid's capital governance and risk management framework including the introduction of the Capital Allocation Selection Hierarchy (CASH) methodology. This methodology involves the assessment and ranking of proposed investments in order to present recommendations for the optimal range of a risk prioritised investment portfolio to the Networks NSW Board. The combination of the revised capital program and the introduction of the CASH methodology for governance review has resulted in a reduction of approximately 24% or $1.4bn for the period FY15-19 in the portfolio investment plan compared to the 2012 Forecast.

(c) The Policy and Strategy workstream focused on the optimisation of policies and strategies adopted by the business. It focused on a number of areas such as property management and fleet which has delivered strong benefits through the reduction in fleet:

(i) Property management – Ausgrid focused on the divestment of properties surplus to the longer term needs of the company. Ausgrid sold some of the properties it owned to achieve savings in property. This includes the sale and lease-back of the head office building in FY2014 and the sale of unused land and air space at its Belmore Park property in FY2015.

(ii) Reduction in fleet. In 2014, Ausgrid reduced its fleet size by 583 vehicles by developing policies which reduced the fleet requirements and identifying vehicles which were excess to requirements. The savings achieved are shown in Table 6 below. Fleet size continues to be reduced.

Table 6 - Savings from fleet saving initiative ($)

Network Reform Program Savings		FY13	FY14 Q1	F14 Q2	FY14 Q3	FY14 Q4	FY14
Fleet	Opex savings	678,100	591,369	904,834	1,244,943	2,289,744	5,030,889
Fleet	Capex savings	2,843,779	1,573,689	2,690,764	1,882,866	4,449,878	10,597,197

(d) The adoption of procurement strategies to obtain benefits for the business. Ausgrid has developed a robust procurement policy to ensure value for money. Ausgrid's procurement policy and process manual are attached as Annexure 10.

134. In addition to the Network Reform program, Ausgrid has implemented / is implementing a number of management cost saving initiatives, including:

(a) Mix & Match Program for field staff, including voluntary redundancy. The Mix & Match Program allows a staff member to voluntarily relocate to another position while the staff member in the other position chooses voluntary redundancy. This program is 50% complete. Benefits of $5.2 million dollars were achieved in FY2014 (with redundancy costs at $3.1 million);

(b) Fleet, in relation to extending lives of vehicles through amending lease terms and terminating existing leases for surplus vehicles, 100% complete, achieved $5 million in actual savings for FY2014;

(c) Travel and accommodation, in adopting a revised policy and more rigorous approval processes, 60% complete, achieved $0.6 million in actual savings for FY2014;

(d) Purchase cards, reviewing and adjusting credit card limits, 100% complete, achieved $1.8 million actual savings for FY2014;

(e) E-tags, in relation to business travel, 50% complete, achieved $0.4 million dollars actual savings for FY2014;

(f) re-negotiating its electricity supply contract for its offices and depots to achieve electricity cost savings, 100% complete, achieved $1.8 million in actual savings in FY2014;

(g) reduced funding for staff club contributions, 100% complete, achieved $0.2 million (annualised) in actual savings for FY2014;

(h) updating Ausgrid's taxi policy, (this project is 50% complete, benefits have not yet been realised); and

(i) reviewing administrative support staff requirements, including identifying roles surplus to future operations (this project is 50% complete; benefits have not yet been realised).

135. Ausgrid has been able to reduce its headcount by taking various initiatives in the last several years. This includes transforming from a decentralised management model to a centralised management model and implementing labour / agency operating model. The number of headcount reductions from the start of January 2013 until the end of December 2014 is 976 agency and employees.

136. Ausgrid is constrained by the no forced redundancies clause in its enterprise agreement however was able to reduce staff where appropriate. Further Ausgrid have put in place measures to reallocate staff so that they continue to be productive and do not become a

stranded resource (ie the Mix and Match program referred to above). A break-down of numbers of staff redeployed as a result is listed in the table below.

Table 7 - Break-down of staff redeployed

Division	Total	Not a Redeployee	Redeployee
Chief Engineering	470	433	12
Finance and Compliance	319	150	152
Health, Safety and Environment	86	76	6
Information, Communication and Technology	277	270	4
Network Development	615	570	33
Network Operations	2756	2710	69
People and Services	845	775	65
Total	**5368**	**4994**	**341**

137. The total employees in this table is inclusive of 197 redeployees who previously provided services under the Transitional Services Agreement related to the sale of Ausgrid's retail business in 2011.

Opex reduction

138. If the opex expenditure ultimately allowed by AER is that provided in its Draft Determination, I consider that the reduction would lead to significant reduction in Ausgrid's operational performance.

139. In my view, the reductions as proposed in the AER's Draft Determination go well beyond the costs able to be absorbed by outsourcing a greater component of our activities. The reductions would require reducing the level of operational activities currently carried out, which are described in the next section of this statement.

Operational tasks carried out by Ausgrid

140. Ausgrid's Network Operations team completed a total of 172,058 planned asset maintenance tasks in financial year 2013/14. A further 56,059 emergency maintenance tasks were also completed by Network Operations during this time.

Table 8 - 2013/14 Financial Year Number of Planned Maintenance Tasks

Work Group / Work Description	Completed
Asset Services	353
Field Services Subs	6,632
Network Earth	20
Network Test Portable Earths	21,445
Network Test Subs Thermal	109
Transmission Subs Protection	9,449

Transmission Subs Voltage Regulation	3,538
Transmission Subs Workshops	714
Overhead Line Inspection	103,868
Pillar Thermal Inspection	8,796
Pit and Link Box Lid Inspection	1,402
Pole Inspect and Treat	5,607
Pre Bushfire Season Patrols	160
Tower Inspections	91
Transmission Mains Underground	342
Underground Line Inspection	9,532
Total	**172,058**

141. The tasks required reflect all maintenance tasks that are needed to be carried out to maintain a safe, reliable and sustainable network for customers. These task lists have been developed based on a detailed understanding of the network infrastructure, failure rates, redundancies and other safety and reliability concerns.

142. It is important to note that the increase or decrease of peak levels of demand in Ausgrid's network does not have a material impact on Ausgrid's required level of operating expenditure. This is because the level of opex required is determined by the relevant asset base, and operational standards and strategies, rather than the electricity demand supplied by the relevant asset base.

143. Underlying each of maintenance work groups are a series of predefined maintenance work instructions. There are in excess of 270 work instructions that articulate the works to be carried out for maintenance activities.

144. As an example, 3 maintenance work instructions for common maintenance activities carried out by Network Operations are as follows.

Table 9 - Maintenance work instructions for Common Maintenance Activities

Work Group	Maintenance Work Instruction	Description	Crew Size	Annexure
Overhead Line Inspection	Overhead Line Inspection (OH0112)	A very common maintenance activity whereby line workers will inspect a section of line at intervals of time (in this case every 5 years) based on an understanding of cable materials, environment, conditions and consumption on the network area.	1	21
Transmission Subs Protection	CB Functional Checks (SW0608)	A maintenance activity that involves the exercising and performance timing of electrical circuit breakers. These tasks	2	22

		are mostly performed every 12 months.		
Pillar Thermal Inspection	Low Voltage Pillar Thermal Inspections (UG2101)	A maintenance activity that involves measuring the temperature of electrical pillar/turrets located within suburban streets. These tasks are performed every 12 months.	1	23

145. The work instructions are provided as Annexures. Each of these instructions articulates the resources (materials), labour (hours) and tasks that are to be undertaken for each maintenance procedure to occur. Of note, the average crew size for a substantial proportion of maintenance works is two, due to safety considerations.

146. Overhead lines, transmission substation circuit breakers and pillar connection boxes are essential parts of the Ausgrid network, providing reliable and safe supply to customers.

147. Following the above examples, the average time taken to carry out an overhead line inspection is 0.25 hours with a crew of 1. Testing of a circuit breaker in a substation is 1 hour with a 2 person crew and a pillar thermal inspection is 1 person for 0.2 hours.

148. Failure to carry out scheduled maintenance will likely result in reduced reliability with increased breakdowns and interruption to end customers driving increases in unplanned maintenance. Safety standards would also be compromised with circuit breakers failure, failure of pillar boxes and live wires falling potentially causing serious injury to customers and staff.

Implications of Reductions in Operating Expenditure allowances to Planned Maintenance

149. Ausgrid's Network Operations team, as part of its values, continues to improve the network and look to identify, safer, better ways to carry out tasks, and look to improve customer value.

150. Given the nature of the longevity of the assets and the infrastructure involved, changes and improved work practices will deliver financial savings and returns over much longer time horizons when compared to other industries.

151. Further, as noted above, work instructions and planned maintenance schedules have been carefully developed to optimise risk and cost. Changes to work instructions require reconsiderations for safety standards, asset tolerances and failure rates across the network and are routine.

152. Although work instructions require substantial reconsideration and timely refinement, any substantial and immediate reduction in Operating Expenditure allowances can only be accommodated through reduced work activities.

153. For example, if, in response to a 40% reduction in Operating Expenditure, Ausgrid implemented a 40% reduction in maintenance work, this would result in a reduction of 73,794 work activities.

154. An example of this new work schedule is noted below in Table 10.

Table 10 - Revised work activity at 40% reduction

Work Group / Work Description	Required	40% Reduction
Asset Services	513	212
Field Services Subs	6,883	3,979
Network Earth	22	12
Network Test Portable Earths	22,341	12,867
Network Test Subs Thermal	109	65
Transmission Subs Protection	10,149	5,669
Transmission Subs Voltage Regulation	3,599	2,123
Transmission Subs Workshops	742	428
Overhead Line Inspection	106,195	62,321
Pillar Thermal Inspection	8,796	5,278
Pit and Link Box Lid Inspection	1,501	841
Pole Inspect and Treat	5,834	3,364
Pre Bushfire Season Patrols	160	96
Tower Inspections	140	55
Transmission Mains Underground	475	205
Underground Line Inspection	9,569	5,719
Total	**177,028**	**103,235**

155. The flow on impacts to the example work instructions noted above can also be summarised in Table 11 as below.

Table 11 - Flow-on impacts to the example work instructions

Maintenance Work Instruction	Impact
Overhead Line Inspection	Increased line failure rates, increased substantial emergency works given reduced maintenance schedules, higher outage intervals, potential catastrophic events e.g. Bushfires triggered by line and cross arm collapses
Circuit Breaker Functional Checks	Customer outages across larger areas, potential damage to assets as well as increased risk to public and work safety.
Low Voltage Pillar Thermal Inspections	Heating and potential melting of pillar housing which in turn would either result in customer outages for residential customers as well as potentially directly expose the public to live electrical apparatus that would be within the prescribed minimum safety clearances.

156. The impacts detailed above are likely in future periods. Of concern is the foreseeable impact to customer safety and the environment, the transition to a reactive emergency

based work focus, potential increased long run costs, reduced reliability and a more unsustainable and aged network.

Potential consequences of revenues cuts

157. As noted at paragraph 133133(b) above, the CASH methodology is used to assist in selecting the projects which best meet Ausgrid's business objectives for inclusion into the capital expenditure planning process each year. The CASH methodology considers projects in relation to pre-determined categories of risk, for example the most recent CASH ranking considered:

- Network asset condition
- Public safety, environmental or regulatory impact
- Network initiated fire risk
- Network reliability impact
- Community impact (Reputation)
- Work health safety – employee risk
- Network capacity implications

158. The risk categories are weighted equally in assessment. In order to facilitate an effective prioritisation, each program is broken down into pre-prioritised subcomponents of short term need (immediate requirement), medium term need (short-term requirement, but risk-manageable prior to replacement), and long term need (expected future or strategic renewal requirement).

159. In relation to opex, Ausgrid has determined the amount of opex it requires for its IRP and RRP based upon the opex required to maintain the safety and reliability of its network assets and the operation of the network as set out at paragraph 113 and following. Ausgrid has incorporated efficiency savings into those projected amounts. The amount of opex proposed by the AER in its Draft Determination is far below the opex required to maintain safety and reliability to an adequate standard. If the Draft Determination was to be adopted, Ausgrid could not carry out a significant part of the opex it had planned over the regulatory period. A failure to perform that opex will mean that network assets will not be maintained in a timely fashion or inspected in a manner which enables preventative maintenance to occur. This is likely to result in increased asset failures.

160. For example, Networks NSW has engaged R2A on behalf Ausgrid and the NSW DNSP's to conduct an Asset/System Safety Risk Assessment. As part of this review, an assessment of the impacts of extending maintenance cycles due to a reduction in available opex was undertaken, including a review of the effect on Poles. The review found that a shift in cycle from 5 years to 7.7 years, is expected to increase wood pole failure rates by about a factor of 4.6. ie pole failure rates would increase from 7 failures pa. as experienced in 2013/14 to 33 pole failures pa once the effect of the cycle change was realised. Further the study also found that assuming a similar increased failure rate for other pole-top elements (cross arms, insulators and ties), the rate of equipment fault which has the potential to start a fire will increase by a factor of around 20 for just pole related failures (poles, cross arm, insulators and ties) without even considering conductor failure mechanisms.

161. In general, if the capex program was reduced in order to achieve the AER draft expenditure levels all Ausgrid's programs of work would be reduced on a risk assessed basis. Some equipment which would have been replaced in a timely fashion prior to failure will not be replaced, which will add to the safety and reliability risk of the business. For example 11kV distribution switches which are not replaced will fail in service adding to customer interruptions and restoration times. Some of these switches may be deemed unsafe to operate and require staff to switch at more remote locations extending the level of outage to cover more customers than otherwise necessary.

162. In general terms any deferral or reduction of required network expenditure will increase staff, contractor and public safety risk, environmental risk, bushfire risk, have network reliability implications and have capacity impacts. Another outcome is the return to a 'boom-bust' cycle of investment, as deterioration in asset quality is likely to necessitate increased spending in the future to return the safety and reliability of the network to acceptable levels.

Summary Statement

163. In summary, based on my training, history and experience as an executive of Ausgrid the implications of the AER draft determination, if implemented from both a quantum and step change perspective, are significant.

164. The AER's draft determination, if implemented, will not in my opinion be in the long term interest of our customers, or investors. It will over time create two long term issues. Firstly, intergeneration cost shifting from the boom bust investment cycle. Secondly, the health and safety of the network will deteriorate, causing the level of service Ausgrid provides to customers to suffer and, ultimately, investor confidence will drop

Affirmed at Level 17, 570 George Street, Sydney, New South Wales, this 20 January 2015

Trevor Armstrong

Before me:

Signature of witness:

TRINITY HIGGS

Name of witness:

LEGAL PRACTITIONER

Qualification of witness: Australian Legal Practitioner

Table of Annexures

Number	Document
1.	Position description
2.	Curriculum vitae of Trevor Armstrong
3.	Ausgrid Company Procedure – Risk Management
4.	Ausgrid Asset Management Plan
5.	Overview of Replacement and Duty of Care Plans for the 2015 – 2019 Regulatory Period
6.	Ausgrid Environmental Management System Manual EM 002 29 October 2013
7.	Valuation of Electricity Network Assets – A Policy Guideline for NSW DNSPs issued by the NSW Treasury
8.	Ausgrid Asset Condition and Planning Summary – ACAPS4001 Poles
9.	Ausgrid Network Standard – NS 145 Inspection and Treatment Procedures
10.	Ausgrid Procurement Policy and Process Manual
11.	Letter from RMS Chief Executive Peter Duncan dated 6 January 2015 regarding the Networks NSW blackspot program
12.	Draft notes of meeting with NSW EPA on 29 October 2002 in relation to managing oil leakage related issues at Ausgrid
13.	Ausgrid Environmental management strategy - EMS 350 - Oil Filled Equipment management strategy
14.	Ausgrid Technical Documentation – Vegetation Management Services
15.	ISSC 3 Guideline for Managing Vegetation Near Power Lines
16.	Ausgrid Tree Safety Management Plan (Draft)
17.	Ausgrid Enterprise Agreement
18.	Energy Industries Superannuation Scheme Trust Deed (as at 20 August 2011)
19.	Ausgrid conditional offer presentation to union regarding new enterprise agreement and revised enterprise agreement proposed by Ausgrid
20.	Ausgrid Company Procedure – Legislative Register and Environmental Guidelines
21.	Ausgrid Maintenance Work Instruction – Overhead Line Inspection (OH0112)
22.	Ausgrid Maintenance Work Instruction – CB Functional Checks (SW0608)
23.	Ausgrid Maintenance Work Instruction – Low Voltage Pillar Thermal Inspections (UG2101)

Position Description			
Position Title:	Chief Operating Officer, Ausgrid		
Position Number:	tbd	**Division:**	Ausgrid
Reports to:	Chief Executive Officer, Networks NSW		
Date Created:	June 2012	**Date Updated:**	
Job Analyst Name:	Andrew Pitman		
CEO Signature:	(signed)		

ORGANISATIONAL CONTEXT

Networks NSW is the group of companies comprising Ausgrid, Endeavour Energy and Essential Energy. Although they remain separate legal entities with separate network operations, these companies are managed together under common governance arrangements effective from 1 July 2012, to implement the Government's reform of the NSW electricity distribution industry.

As one of the three separate Network businesses, Ausgrid is responsible for the safe and efficient management and operation of the electricity distribution network consistent with the strategy, policies and standards as determined by the common group management structure.

While considerable changes are likely to occur in the operating environment of the business, Networks NSW and each network business will remain focused on:

- Achieving the objectives set out in the State Owned Corporations Act 1989, including
  - Operating at least as efficiently as any comparable privately owned business;
  - Maximising the value of the business to the State;
  - Operating a safe, reliable and sustainable network; and
  - Balancing commercial, social, environmental and customer expectations;
- Implementing initiatives identified under the Network Reform Program; and
- Fully harnessing the skills and capabilities of our people through a clear focus on leadership and cultural transformation, underpinned by our corporate values.

POSITION PURPOSE

The Chief Operating Officer is accountable to the CEO for the safe, reliable and sustainable development, construction, maintenance and operation of all electrical infrastructure in Ausgrid. The Chief Operating Officer also has responsibility for the delivery of safety, human resources, environment, communications and finance support and management of information and operations technology that enables the achievement of Ausgrid's objectives.

The Chief Operating Officer leads a whole of company commitment in which the safety of employees, contractors and the communities in which we work is seen as the number one priority and where continuous improvement in safety performance is owned by all employees.

The Chief Operating Officer is responsible to manage Ausgrid's performance of its contractual obligations with [insert Retailer] under the terms of the Transitional Services Agreement.

KEY ACCOUNTABILITIES

The Chief Operating Officer is accountable for the positions and key functions described below:

Chief Engineer

- Provide long term stewardship of the network including policies, standards, growth, renewal and maintenance planning, and reliability and compliance management. This includes development of a detailed asset management program within a framework determined by Group General Manager Network Strategy and development of plans to optimally sustain network condition, safety, asset utilisation, supply security and network performance.
- Direct and manage strategic projects including network technology.
- Manage the implementation of the network strategy & compliance framework as determined by Group General Manager Network Strategy.

Network Development

- Overall program management and delivery of the network capital and maintenance programs. This includes the establishment of a Program Management Office to provide end to end project management of all projects (including contractor management and the external works program).
- Deliver efficient and effective asset management services including vegetation management, asset inspection and streetlight management.

Network Operations

- Overall management of the network to deliver a safe, reliable and sustainable outcome
- Manage field operations resources to maintain the electricity distribution network to meet license requirements and customer expectations. This includes works scheduling, program delivery, supply interruptions, emergency response, line safety management and implementation of the metering strategy.
- Maintain oversight of the network and work being conducted on the network. This includes management of the systems control function.

People and Network Services

Support the network business through the delivery of key support activities as follows:

- Manage the provision of core people services to support improved delivery of business outcomes. This includes employee relations and business partnering, change management support employee advice, recruitment, payroll and training. This also includes implementation of Group people strategies and policies.
- Support the operations of the network business through the delivery of key support activities including customer and market services, procurement, transport, property and logistics consistent with strategic direction from the Group.
- Deliver local internal and external communications and stakeholder management. This includes employee communications, regional media management and community relations activity.
- Deliver retail support services to True in accordance to service levels established in the Transitional Services Agreement.

Finance and Compliance

- Financial management of the business including risk, compliance and regulation. This includes providing financial management support for the business, financial reporting and analysis, business development and commercial support, general ledger, accounts payable, budgeting and forecasting processes and provision of decision support analysis and advice.
- Manage governance requirements including risk and insurance, compliance, audit, fraud control and records, and provide Board and Executive support as required.

Health, Safety and Environment

- Manage the health, safety and environment strategy, program development, audit and compliance. This includes the development and management of health, safety and environment management systems within the network business in line with Group strategy and policies.
- Implement public safety strategies and investigation of accidents and incidents and capture to learnings in order to improve safety and environmental management systems and performance.

Information Communication and Technology

- Manage the provision, delivery and operations of all network and business Information, Communication and Technology (ICT) requirements in line with Group strategy. This includes leading Ausgrid's IT/OT approach and delivery to optimise capital investment and opex spend, maximise value from IT/OT investments and drive efficiencies in the business which are aligned to Group strategy and initiatives.
- Maintains and operates network security and SCADA systems.

POSITION DIMENSIONS

Staff
Number of direct reports: 7
Number of staff reporting indirectly: approx 6000 FTE

Budget (annual) direct responsibility
CAPEX $1.7b
OPEX $797m

(Based on 2012/13 budget targets)

Value of electricity assets: $12.7billion

CHALLENGES

- Ensuring a whole of organisation focus and commitment to safety as the “number on” priority and continuous improvement in safety performance
- Leading a large organisational change and reform agenda delivering significant cash savings in line with performance and savings objectives determined by Network’s NSW
- Meeting the customer service and network performance targets for Ausgrid
- Development of a culture that is safety focused, customer centred and efficiency drive
- Manage Ausgrid’s unions based on respect and consultation to deliver value to Ausgrid customers
- Developing a Strategic Asset Management Plan (SAMP) consistent with group policies and standards, including growth, renewal, compliance and maintenance plans and ensuring their implementation
- Lifting the performance of Ausgrid through optimised use of resources, rationalisation of operations
- Implementing Group strategies, policies and frameworks, and working to matrixed reporting relationships

KEY RELATIONSHIPS

- Chief Executive Officer, Chief Operating Officers, Group Executives and Board - advising and reporting on Ausgrid plans and performance.
- Managers and key staff - promoting organisational and business change, setting performance targets, leading cultural change and dealing with performance shortfalls.
- Major contractors and business customers - resolving major contractual performance problems.

WORK HEALTH AND SAFETY

Demonstrate personal leadership in the implementation of Ausgrid's Safety Management System and facilitate its effectiveness by ensuring adequate resources are available, that all employees are aware of their Work Health and Safety obligations and that one's personal behaviour models the organisation's commitment to Work Health and Safety.

ETHICS, EEO, ENVIRONMENT AND QUALITY

All employees within Ausgrid are required to have an awareness of, and a commitment to:

- The Ausgrid values and code of ethics
- Equal Employment Opportunity
- Environmental Management Protection

This is in addition to the specific job details described in this document, and in conjunction with the appropriate Ausgrid policies and procedures as amended from time to time.

KNOWLEDGE, SKILLS AND EXPERIENCE

Desirable Qualifications

- Tertiary qualifications in engineering or relevant degree discipline.
- Management qualification from a recognised institution.

Experience

- A senior executive with demonstrated experience in managing large scale infrastructure operations with significant weighting of experience in the electricity distribution industry.
- Strong resource, budget and people management and leadership with demonstrated experience in driving substantial reform and change agendas.
- Industrial Relations experience at a senior operating level in a highly industrialised environment.

LEADERSHIP COMPETENCIES

COMPETENCY	EXECUTIVE BEHAVIOURS
Strategic thinking Sees the bigger picture. Applies experience and knowledge to bring fresh insights and new ideas to the business.	▪ Conceptualises and delivers something new or significant for the business ▪ Breaks the mould, realises opportunities that others cannot see ▪ Can create innovative, breakthrough strategies and plans.
Initiative Anticipates and takes action to create opportunities, overcome challenges and avoid future problems.	▪ Anticipates and takes action to create an opportunity or avoid a future problem, looking ahead within a three to five year time frame ▪ Creates a framework which enables others to consider and/or anticipate the potential for future problems ▪ Proactively seeks out strategic opportunities to grow the business ▪ Re-shapes the organisation to take advantage of long term growth opportunities ▪ Thinks of and takes action which will benefit the whole organisation.
Developing others Recognise's others' potential and their development needs. Supports their capability and long term.	▪ Provides (or assigns others to provide) in depth coaching or mentoring and ongoing developmental support ▪ Carefully selects development assignments in order to build long term capability.
Leading people Energises and aligns employees around a shared vision. Creates a climate in which our employees want to do their best.	▪ Provides a clear vision of future success which is compelling and engaging ▪ Believes in the vision and inspires confidence in the vision ▪ Generates excitement, enthusiasm and commitment to the vision ▪ Talks about possibilities; is optimistic about the future.
Communicating and influencing Gains the support of key stakeholders in courses of action that benefit the business.	▪ Thinks through how they will influence over time and develops deliberate influencing strategies ▪ Builds support for ideas through informal stakeholders ▪ Uses an in depth understanding of the interactions within a group to move towards a specific outcome.
Mobilising change Displays openness to change, inspires others to change and acts to make change happen.	▪ Creates a sense of urgency for change ▪ Challenges the status quo when appropriate by comparing it to an ideal or vision of change ▪ Anticipates and take actions to address the emotional impact of change ▪ Recognises and reinforces the behaviours of those who embrace the change ▪ Encourages others to recognise that change is the norm.
Customer focus Creates customer value by understanding and acting in the best interests of the customer.	▪ Looks for long term benefits that create value for the customer ▪ Becomes involved in the customer's decision making process as appropriate ▪ Builds an independent opinion on customers' needs and problems; recommends approaches which are ▪ new and different from those requested by the customer ▪ Anticipates the customer's future needs.
Drive for results Takes personal accountability for delivering results. Displays an inner drive to improve performance and achieve a standard of excellence.	▪ Takes calculated risks to achieve long term improvement ▪ Conducts detailed cost-benefit analyses, being mindful of the corporate values ▪ Persistently drives through obstacles ▪ Puts commercial results ahead of personal credibility; is courageous in decision making.
Holding to account Takes personal accountability for delivering results. Displays an inner drive to improve performance and achieve a standard of excellence.	▪ Rigorously manages performance against demanding targets ▪ Consistently challenges individuals openly and constructively about performance problems; takes action ▪ if performance does not improve ▪ Creates a 'performance culture' where effective performance and continuous improvement are valued.

Curriculum Vitae

PERSONAL INFORMATION

Name: **Trevor Mark Armstrong**

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Company Procedure

GOVERNANCE	Document No	:	GV000-P0023
	Amendment No	:	0
	Approved By	:	CEO
	Approval Date	:	29 July 2014
	Review Date	:	29 July 2017

GV000-P0023 RISK MANAGEMENT

1.0 PURPOSE

To articulate the company's risk management process, assessment methodology and reporting requirements.

2.0 SCOPE

This procedure has direct application to the management of material risks at a Corporate level and all or parts of this procedure have applicability to assist with risk management associated with:

- fraud and corruption;
- major business process change;
- major capital projects;
- asset management investment prioritisation;
- major IT projects;
- business continuity – Business Impact Assessments; or
- whenever there is a need to formally document the risks associated with one-off situations.

This procedure is not intended to replace established risk-based processes used to assess site or task specific risks, eg environmental site assessments, safety risks associated with tasks.

3.0 REFERENCES

Board Policy (Governance) – Governance
Board Policy (Governance) – Risk Management
Board Policy (Governance) – Compliance
Company Policy (Governance) – Business Continuity Management
Company Procedure (Governance) – Changes to Risk Based Management Plans
Company Procedure (Governance) – Insurance Purchase Procedures
Company Procedure (Health and Safety) – Be Safe Procedures 10 & 11
Company Form (Governance) – Risk Assessment Template
Company Form (Governance) – Change Management Risk Assessment Template
Company Form (Governance) – Risk Management Reporting Template
Company Form (Governance) – Emerging Risk Register
Risk Management RACI Matrix
Risk Assessment Training Manual

External:
Work Health and Safety Act 2011 (NSW)
AS Records classification handbook – HB5031 – 2011
NSW Treasury Risk Management Toolkit for the NSW Public Sector (TPP12-03)
ISO 31000:2009 – Risk Management – Principles and Guidelines
General Retention and Disposal Authority: Administrative Records GA28

4.0 DEFINITIONS

Where applicable, definitions are consistent with ISO 31000:2009 – Risk Management – Principles and Guidelines.

As Low As Reasonably Practicable (ALARP)
Core to this concept is "reasonably practicable". The objective is to eliminate risk. If it is not reasonably practicable to eliminate a risk, then it should be minimised to as low as reasonably practicable (in accordance with the hierarchy of controls). ALARP is the level of risk that is tolerable and cannot be reduced further without the expenditure of cost, time and/or effort that is disproportionate to the benefit gained or where the solution is impractical to implement.

Bow-Tie Methodology
The Bow-Tie methodology is used to understand the control environment. It provides a graphical means to describe the relationship between hazards, hazardous events (centre), causes (left side) and consequences (right side). Barriers are used to display what measures an organisation has in place to control the risk.

Business Continuity Management (BCM)
Holistic management process that identifies potential threats to an organisation and the impacts to business operations those threats, if realised, might cause, and which provides a framework for building organisational resilience with the capability of an effective response that safeguards the interests of key stakeholders, reputation, brand and value-creating activities [ISO 22301].

Business risk category
Nine business risk categories have been identified for grouping high level risks that have the potential to prevent the company from achieving its objectives. A Risk Category Owner is assigned to monitor the risk management activities undertaken in regard to each business risk category.

Cause
A factor that could lead to the hazardous event occurring. For distinct hazardous events, causes need to have the ability to result in the hazardous event in their own right. Where hazardous events are stated in more general terms, the cause should be expressed in terms of a contributing hazardous event related to an activity.

Common Risk Matrix
The 5 x 5 matrix appended to the Board Policy Risk Management that is used to determine the risk rating for a particular combination of consequence and likelihood. The common Risk Matrix reflects the risk appetite approved by the Board.

Control
Measures that modify risk. Controls include policies, procedures, processes, devices, practices or other actions which modify risk. These may also be described as "barriers".

Control environment
The combination of a suite of controls, (both prevention and mitigation) contained on a bow-tie in place to manage a risk.

Consequence
The outcome of an event affecting objectives.

Corporate Risk Management Plan
The Corporate Risk Management Plan details the risks to the achievement of the company's strategic and operational objectives. This includes the company risk profile, results of the risk assessments, key risk indicators and the treatment action plans.

Divisional Governance, Risk & Compliance (GRC) Representatives
The Executive Leadership Team nominated representative that coordinates governance, risk and compliance related initiatives and reporting within each division.

Document Control
Employees who work with printed copies of documents must check the Business Management System (BMS) regularly to monitor version control. Documents are considered "uncontrolled if printed", as indicated in the footer.

Escalation factor
See primary control defeating factor.

Escalation control
See supporting control.

Executive Leadership Group
Chief Executive Officer, Chief Operating Officers, Group Chief Financial Officer, Group Executive Network Strategy, Group Executive People & Services and Board Secretary.

Executive Leadership Team
Chief Operating Officer, General Manager Health, Safety & Environment, General Manager People & Services, Chief Engineer, General Manager Network Development, General Manager Network Operations, General Manager Finance & Compliance and General Manager Information, Communications & Technology.

External context
The external environment in which the company seeks to achieve its objectives. External context may include:

- cultural;
- social;
- political;
- legal;
- regulatory;
- financial;
- technological;
- economic;
- natural and competitive environment (whether international, national, regional or local);
- key drivers and trends having impact on the objectives of the company; and
- perceptions and values of external stakeholders.

Group Risk Category Owner
The Group Executive with the authority and accountability to undertake risk assessments to support the delivery of the Strategic Plans, and reviewing and endorsing the risk ratings and ALARP status of the hazardous events included in their risk category.

Hazard
Source of potential harm.

Hazardous event
An event which has the potential to cause harm (ie loss or damage).

Hierarchy of controls
Elimination of a hazard is the most effective control and if this is not reasonably practicable to achieve, implementation of additional controls should be considered based upon their degree of effectiveness. This order is referred to as the hierarchy of controls and comprises elimination, substitution, isolation, engineering controls, administrative controls and finally use of personal protective equipment.

Inherent risk
The inherent risk rating is based on the plausible worst case scenario assuming the absence of company established controls but with the presence of existing external controls such as regulations, road rules etc. and reliance on common sense.

Insurance
A contract in which the insurer agrees to compensate the insured (the company) for any losses or damages caused by risks identified in the contract.

Internal context
The internal environment in which the company seeks to achieve its objectives. Internal context may include:

- governance, organisational structure, roles and responsibilities;
- policies, objectives and the strategies that are in place to achieve them;
- the capabilities, understood in terms of resources and knowledge eg capital, time, people, processes, systems and technologies;
- information systems, information flows and decision making processes (both formal and informal);
- relationships with, and perceptions and values of internal stakeholders;
- the company's culture;
- standards, guidelines and models adopted by the company; and
- form and extent of contractual relationships.

Key control
A control that lies directly on the path between a cause and a hazardous event and if not operating effectively, would result in a significantly weakened control environment. Key controls are a subset of primary controls and may be subject to more frequent monitoring and auditing due to their relative importance.

Key Risk Indicator (KRI)
An indicator used to monitor the effectiveness of the control environment and can be either active (leading) or reactive (lagging). Active indicators measure variables that are believed to be precursors of future risk management performance. Reactive indicators measure historical, after-the-fact performance to show when the desired outcome (in terms of controls) has not been achieved.

Likelihood
Chance of something happening.

Network Fatal Risk
A hazardous event that has the potential to result in a permanent disability or fatality. Network Fatal Risks are those that can be described as low frequency, however high consequence and form a prioritised subset of operational risks.

Operational Risk
A hazardous event linked to day-to-day activities undertaken by the company.

Positive risk culture
Is evident in a company when employees are aware of the company's activities, operations and objectives; consider the opportunities and what can go wrong; and takes action to harness the opportunities and address the consequences.

Primary control
A control that lies directly on the path between a cause and a hazardous event. It may or may not be a key control.

Primary control weakening factor
A condition that leads to increased risk by defeating or reducing the effectiveness of a primary control. When being considered as part of an incident investigation these may also be described as “contributory factors”.

Project Manager
The employee that leads a particular project and is responsible and accountable for completing the project on time and on budget in a safe and environmentally responsible manner.

Project/Program Sponsor
Manager or individual to whom the Project Manager is accountable.

Recordkeeping
Making and maintaining complete, accurate and reliable evidence of business transactions in the form of recorded information (Source: AS Records classification handbook – HB5031 – 2011).

Residual risk
The risk remaining after risk treatment. Also refers to the current level of risk taking into account the existing controls and their known level of effectiveness.

Responsible, Accountable, Consult, Inform (RACI) Matrix
A chart which describes the participation by various roles in completing tasks or deliverables for a project or business process.

Review date
The review date displayed in the header of the document is the future date for review of a document. The default period is three years from the date of approval however a review may be mandated at any time where a need is identified due to changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice.

Risk
The effect of uncertainty on objectives.

Risk analysis
The process to comprehend the nature of risk and to determine the level of risk. Risk analysis provides the basis for risk evaluation and decisions about risk treatment.

Risk appetite
The amount and type of risk that the company is willing to pursue, retain, take or turn away from risk. Refer to the risk criteria set out in Table 3.

Risk assessment
The overall process of risk identification, risk analysis and risk evaluation.

Risk Category Nominated Lead
Generally a Divisional GRC Representative or other employee that has been nominated by the Executive Leadership Team member to assist in the implementation of the Risk Management Framework. There may be more than one Risk Category Nominated Lead nominated per division. The Risk Category Nominated Lead supports the Risk Category Owner as required with Business Risk Category reporting and the annual risk assessment refresh.

Risk Category Owner
The Executive Leadership Team member nominated by the Chief Operating Officer to have oversight of all hazardous events contained within a Business Risk Category.

Risk evaluation
The process of comparing the results of the risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable. Risk evaluation assists in the decision making about the ALARP status and risk treatment.

Risk identification
The process for finding, recognising and describing risks.

Risk management
Coordinated activities to direct and control the company with regard to risk.

Risk Management Framework
The set of foundation documents and organisational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the company.

Risk management plan
A document that formally collates the results of risk assessments related to a specific set of objectives. This includes the risk ratings, key risk indicators and treatment action plans for the reduction of risk to a tolerable level.

Risk management process
The systematic application of management policies, procedures and practices to the activities of communicating, consulting, establishing the context, identifying, analysing, evaluating, treating, monitoring and reviewing risk.

Risk Management Strategic Plan
The Risk Management Strategic Plan details the initiatives aimed at strengthening system weaknesses identified through the monitoring and review of the Risk Management Framework. Implementation of the Risk Management Strategic Plan aims to embed continuous improvement in the Risk Management Framework and its application. Covering a three year period, the Risk Management Strategic Plan is reviewed and revised annually.

Risk Owner
The employee with the authority and accountability to make decisions to treat, or not to treat a risk. Generally this is the Risk Category Owner, however it may be another Executive Leadership Team member with accountability for the management of the hazardous event and development and completion of treatment action plans. (For projects refer to the Project/Program Sponsor.)

Risk profile
The description of the company's risks.

Risk register
A record of information about related identified hazardous events including descriptions, controls and risk ratings.

Risk treatment
The development and implementation of measures to modify risk. Defined in the Risk Management process as a Treatment Action Plan. Risk treatment measures may include:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk;
- taking or increasing risk in order to pursue an opportunity;
- removing the risk source;
- changing the likelihood;
- changing the consequences;
- sharing the risk with another party or parties (including contracts and risk financing); and
- retaining the risk by informed decision.

Risk tolerance
The company's readiness to accept a residual risk based on the effectiveness of the control environment or the planned risk treatment actions.

Strategic Risk
A hazardous event either related to the development of the Corporate strategy or the delivery of initiatives contained in Strategic Plans.

Subject Matter Expert
An individual with in-depth knowledge of the related business process/es.

Supporting control
A control that prevents a primary control weakening factor defeating or reducing the effectiveness of a primary control. It may also provide forewarning that control effectiveness is reduced.

Uncertainty
The state, even partial, of deficiency of information related to a future event, consequence or likelihood.

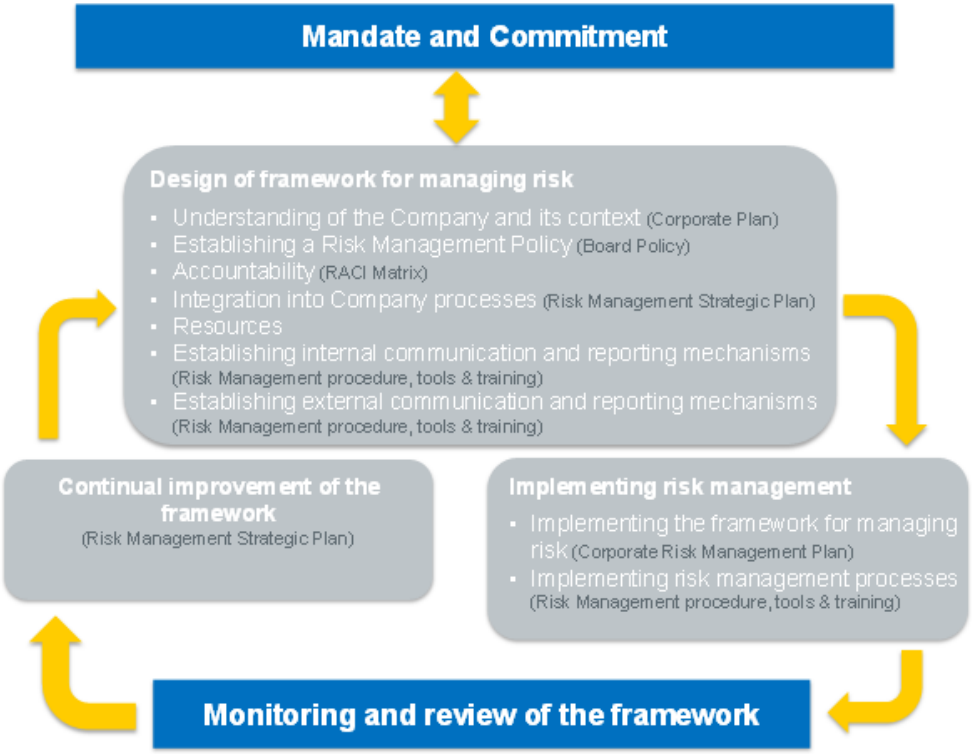
5.0 ACTIONS

5.1 Understanding the Risk Management Framework

The success of risk management depends on the effectiveness of the management framework providing the foundations and arrangements that will embed it throughout the company, at all levels. The framework assists in managing risks effectively through the application of the risk management process at varying levels and within specific contexts of the company. The framework allows for information about risk derived from the risk management process is adequately reported and used as a basis for decision making and accountability at all relevant levels.

Figure 1 describes the necessary components of the framework for managing risk and the way in which they interrelate in an iterative manner.

Figure 1 – Risk Management Framework



Based on: ISO 31000:2009

The Framework applies the Bow-Tie risk assessment methodology that centres on the identification of preventative and mitigation controls in the management of identified potential hazardous events. The objective is always to eliminate risk, however if it is not reasonably practicable to eliminate a risk, then it should be minimised to as low as reasonably practicable (in accordance with the hierarchy of controls). That is elimination followed by substitution, isolation, engineering controls, administrative controls and finally use of personal protective equipment.

The Bow-Tie methodology focuses on assessing the consequence and likelihood of hazardous events affecting each Network company's operations and their ability to deliver specific priority actions and/or programs. Additionally, the Framework incorporates elements from NSW Treasury's recently published "Risk Management Toolkit for NSW Public Sector Agencies" and the NSW Auditor-General's Governance Lighthouse Model.

5.2 Implementing the Risk Management Framework

The framework is not intended to prescribe a management system, but rather to assist the organisation to integrate risk management into the overall management system.

Risk is defined as "the effect of uncertainty on our objectives" and our objectives are detailed in the seven longer term strategic plans relating to health, safety & environment; asset management; finance; risk management; customers; human resources; and technology.

As such, risk management is closely integrated into the business planning cycle. The strategic plans outline the desired outcomes in key areas of business operations and the challenges to be faced in delivering these outcomes, including the underlying assumptions and risks inherent within the plans. Our annual strategic and operational corporate risk assessment process should, where possible, be timed to coincide with business plan development in order that the required treatment actions are adequately resourced.

These linkages are further strengthened through the use of nine business risk categories (see **Table 1**) and linking both Group and company level responsibilities as well as strategic plans to each category as detailed in **Figure 2** below. Systemic weaknesses in the risk framework identified by Risk Category Owners are addressed in the related Strategic Plan.

Table 1 – Business Risk Categories

BR Number	Risk Category	Generic Risk Description	Risk Category Owner
BR 1	Safety	Fatality/serious injury of employee or member of public	General Manager Health, Safety & Environment
BR 2	Network	Significant customer impact related to the Network	General Manager Network Operations
BR 3	Finance	Significant unbudgeted financial loss	General Manager Finance & Compliance
BR 4	Compliance	Liability associated with a dispute or material breach of legislation, licence	General Manager Finance & Compliance
BR 5	Reputation	Sustained public criticism of Ausgrid	General Manager People & Services
BR 6	Environment	Significant environmental incident	General Manager Health, Safety & Environment
BR 7	People	Failure to deliver performance through people	General Manager People & Services
BR 8	Strategy	Strategic objectives are not delivered and business opportunities are lost	Chief Executive Officer
BR 9	ICT	Significant ICT & OT system failure	General Manager Information, Communications & Technology

Figure 2 – Relationship between the Strategic Plans and the Business Risk Categories\

NETWORKS NSW	Main Plan								Networks NSW Strategic Plan	
	Supporting Strategic Plans	Health Safety & Environment Strategic Plan	Asset Management Strategic Plan	Finance Strategic Plan	Risk Management Strategic Plan	Customer Strategic Plan	Health Safety & Environment Strategic Plan	Human Resources Strategic Plan		Technology Strategic Plan
	Group Strategic Plan Owner	Group Executive Network Strategy	Group Executive Network Strategy	Group Chief Financial Officer	Group Executive People & Services	Group Executive People & Services	Group Executive Network Strategy	Group Executive People & Services	Group Chief Financial Officer	Group Executive People & Services
	Supported by:	Group Manager Health, Safety & Environment	Group Manager Asset Strategy & Performance	Group Financial Controller	Group Manager Corporate Governance	Group Manager Customer Service	Group Manager Health, Safety & Environment	Group Manager Human Resources	Group Manager Strategy & Performance	Various ICT & OT
	Group Risk Category Owner	Group Executive Network Strategy	Group Executive Network Strategy	Group Chief Financial Officer	Group Chief Financial Officer	Group Executive People & Services	Group Executive Network Strategy	Group Executive People & Services	Chief Executive Officer	Group Executive People & Services
	Business Risk Category	BR1 Safety	BR2 Network	BR3 Finance	BR4 Compliance	BR5 Reputation	BR6 Environment	BR7 People	BR8 Strategy	BR9 ICT
NETWORK COMPANY	Risk Category Owner	General Manager Health, Safety & Environment	GM Network Ops (Ausgrid) or Chief Engineer (Endeavour & Essential)	General Manager Finance & Compliance	General Manager Finance & Compliance	General Manager People & Services	General Manager Health, Safety & Environment	General Manager People & Services	Chief Executive Officer	General Manager Information, Communications & Technology
	Supported by:	Nominated Representative	Nominated Representative	Nominated Representative	Nominated Representative	Nominated Representative	Nominated Representative	Nominated Representative	Chief Operating Officer	Nominated Representative

Together with elements of the business planning process, the following documents provide the elements required to implement the framework into the company. They are:

- Risk Management Policy incorporating the common Risk Matrix;
- Risk Management Strategic Plan;

- Corporate Risk Management Plan;
- Risk Management Procedure (including reporting requirements); and
- Risk Management tools and training.

5.2.1 Mandate and commitment

The Board approved Risk Management Policy provides the mandate to implement risk management into the company.

The policy is based on the eleven principles of effective risk management which are taken from ISO 31000:2009 – Risk Management – Principles and Guidelines. These principles state that risk management:

1. creates and protects value;
2. is an integral part of all organisational processes;
3. is part of decision making;
4. explicitly addresses uncertainty;
5. is systematic, structured and timely;
6. is based on the best available information;
7. is tailored;
8. takes human and cultural factors into account;
9. is transparent and inclusive;
10. is dynamic, iterative and responsive to change; and
11. facilitates continual improvement of the organisation.

Implementing the Risk Management Framework and its ongoing effectiveness requires strong and sustained commitment.

Section 7.0 and the Risk Management RACI Matrix of this procedure outline the authorities and responsibilities of the Chief Executive Officer, the Chief Operating Officer and the Executive Leadership Team that are required to provide strong and effective leadership of risk management across the company.

5.2.2 Design of the framework for managing risk

The necessary design elements are contained within a series of related company processes as follows:

- understanding of the company and its context is provided through the Strategic Planning process;

- the Risk Management Policy is established by the Board;

- accountabilities have been assigned at a company and Group level as per the policy and procedure, and through the strategic planning process the necessary resources have been allocated; and

- finally, this procedure provides guidance on how to integrate risk management into company processes and outlines the communication and reporting requirements.

5.2.3 Implementing risk management

The Risk Management Board Policy will be utilised by employees to support the promotion of a positive risk culture based on the company's commitment to the management of risk. It contains the common Risk Matrix that reflects the risk appetite approved by the Board. As such, the risk ratings derived using this matrix should be used wherever possible when assessing risks that may have a significant impact on the company.

This procedure is not intended to replace established risk-based processes used to assess site or task specific health and safety or environment risks.

Not all aspects of the common risk assessment process are utilised when undertaking a risk assessment. Guidance on where the company will implement elements of the risk assessment process described in Section 5.3 includes but is not limited to that summarised in Table 2.

Table 2 – Requirements to use elements of the common risk assessment procedure

Risk Assessment for:	Common Risk Matrix ratings	Risk consequence and likelihood criteria	Develop Bow-Tie diagram
Corporate Risk Management Plan	Yes	Common	Yes
Fraud Risk Register	Yes	Common	No
Major business changes	Yes	Common	No
Major capital projects	Yes	Modified	Yes
Major IT projects	Yes	Modified	No
Asset management investment prioritisation	Yes	Modified	No
Business Continuity – Business Impact Assessment	Yes	Modified	No
Litigation Risk Assessment	Yes	Modified	No

Modified consequence and likelihood criteria for projects can be found in Section 5.3.4, other criteria, approved for use by the Risk Manager should be detailed in relevant procedures or workplace instructions.

Risk management will be embedded into the company's practices and processes, particularly into policy development, strategic planning, change management and project management processes. At the corporate level, the Risk Management Framework and risk management process will be applied to the development of a Corporate Risk Management Plan.

Risks identified as having a significant impact on the company's objectives are detailed within the Corporate Risk Management Plan and are categorised as follows:

- Strategic Risks – linked to development and delivery of the Group Strategy;
- Network Fatal Risks – associated with identified potentially fatal work activities; and
- Operational Risks – linked to day-to-day operations.

Developing and maintaining the Corporate Risk Management Plan will be a continuous process, as will the process of managing risk. Newly identified risks and emerging risks that arise as a result of a change in the business environment or through fresh brainstorming, will be incorporated into the Corporate Risk Management Plan. The company will view the Corporate Risk Management Plan as a dynamic, live document.

Prior to the annual refresh of the Corporate Risk Management Plan, the description and naming conventions for the Network Fatal Risks must be confirmed with the Group Manager Health, Safety & Environment.

More generally, risk registers and where required, their associated risk management plans, can be set up for recording the details of risk assessments of specific hazardous events such as other safety risks, project risks or fraud risks.

Risk management plans should be developed in instances where there is a need to monitor ongoing risk. Risk assessments undertaken to support decision making may not require the development of risk management plans.

5.2.4 Training in application of the framework

As a minimum, the Risk Manager will provide either risk awareness training or more detailed technical training in the application of this procedure. Training sessions will be scheduled ahead of the annual Corporate Risk Management Plan refresh and dates published in an annual training calendar. The application of this procedure will be supported by more detailed instructions that can be found in the Risk Assessment Training Manual.

5.2.5 Monitoring and review of the framework

An effective Risk Management Framework, process and tools that continue to support the company, will require the performance of risk management across the company to be monitored and reviewed. Developments in risk management in the community, including better practices applied in other organisations will be monitored and assessed. The results of the monitoring and review process, together with input from the Network companies, will be captured in the Group Risk Management Strategic Plan and used to update the Risk Management Framework.

5.2.6 Continual improvement of the framework

A Risk Management Strategic Plan will be developed on a three year cycle, with a review annually to identify initiatives to improve the Risk Management Framework.

The Risk Management Strategic Plan will focus on the implementation of the Risk Management Policy, principles contained within the policy, and the integration of effective risk management into the company's key processes.

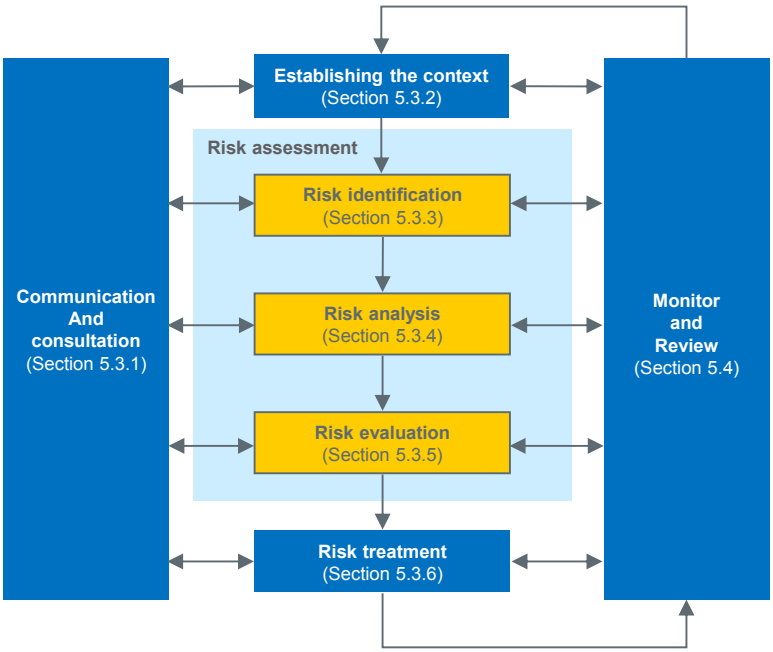
5.3 Risk management process

All managers and employees of the company are responsible for managing risk. A risk is defined as the effect of uncertainty on objectives.

To manage risk, managers and employees will, where required, apply the risk management process defined in this procedure, to identify, analyse and evaluate the effect of uncertainties on their business objectives.

The company's process for the management of risk is based on ISO 31000:2009 and is reproduced in **Figure 3.** Request for support or training in the application of this procedure should be directed to the Risk Manager.

Figure 3 – Risk management process



Based on: ISO 31000:2009

The risk management process should be applied as previously detailed in Section 5.2.3. It is recommended that this risk management process also be applied when there is a requirement to formally document the risks associated with one-off situations.

5.3.1 Communication and consultation

The first step of the risk management process is communication and consultation. Communication and consultation will be undertaken with internal and external stakeholders as appropriate and will be maintained throughout the risk management process (as indicated in **Figure 3**). Employees and managers should plan the communication and consultation process to gain support and input from their colleagues during the earliest stages of the risk management process. It should be noted that the degree of consultation is at the discretion of the person undertaking the risk assessment. The communication and consultation process should address information and issues relating to the identified risk, its causes, consequences the existing controls and potential alternative controls.

Effective communication and consultation may involve discussions with experienced and knowledgeable persons, literature reviews including the review of previous risk assessments, incident investigations, audit reports, discussion and survey with stakeholders and the community. In an effective, mature risk assessment, consultation and communication will continue throughout the risk assessment process by bringing together employees with differing areas of expertise. This is typically achieved by identifying multi-disciplinary teams of employees in the form of a risk assessment workshop. The consultation process is also important when evaluating risk and for gaining agreement and endorsement for Treatment Action Plans (refer to Section 5.3.6).

Communication and consultation with stakeholders is important as stakeholders make judgements on risk based on their individual perception. These perceptions can vary due to differences in their risk tolerance, needs, assumptions and concerns; however it is important that these differences are explored and taken into account during the risk assessment.

In relation to the annual refresh of the Corporate Risk Management Plan, the Risk Owner must confirm/nominate the subject matter expert for the hazardous event prior to commencement of the assessment. The subject matter expert should lead the technical input to the risk assessment and

in consultation with the Risk Manager, should then propose those that are to be consulted during the assessment of the hazardous event.

5.3.2 Establishing the context

The context (internal and external) will be established at the commencement of the risk assessment process, describing the objectives and scope of the risk assessment, and the internal and external parameters to be taken into account when managing the risk. Key elements of the context will be the company's values, purpose, plans and priorities.

Establishment of the context will also include the definition of the risk tolerance for the evaluation of risk. The company's risk tolerance is summarised in **Table 3**.

Table 3 – Risk tolerance

Risk Tolerance
A risk is tolerable when the risk is reduced to as low as reasonably practicable (ALARP).
Risks are also tolerable if they are Non-ALARP and have a Treatment Action Plan in place to reduce the risk to ALARP.
Risks that are Non-ALARP, with no Treatment Action Plan in place are considered intolerable.

Further guidance on determining risk tolerance is presented in section 5.3.5.

5.3.3 Risk identification

Risk identification involves the process of systematically identifying the uncertainties to the achievement of objectives. The uncertainty is expressed in the form of a hazardous event, ie what is the event that will prevent the achievement of the objective? The hazard being any source of harm. It is also important to identify the risks associated with not pursuing an opportunity. Where specified in **Table 2** or whenever deemed useful, the control environment associated with each risk or hazardous event should be defined in the form of a Bow-Tie diagram.

An example Bow-Tie is shown in **Figure 4**, clearly defining the links between the hazardous event, causes, consequences and controls. Controls will be defined as either preventative controls or mitigation controls. Bow-Tie diagrams will be developed/reviewed and updated in consultation with the Risk Manager to maintain integrity of the data and to manage version control.

The development of a Bow-Tie starts with the identification of uncertainty, hazards or a potential source of harm that will impact an objective. The uncertainty or hazard will then be characterised in the form of a hazardous event and placed at the centre of the Bow-Tie. The causes of the hazardous event will be identified and placed to the left, followed by the consequences on the right.

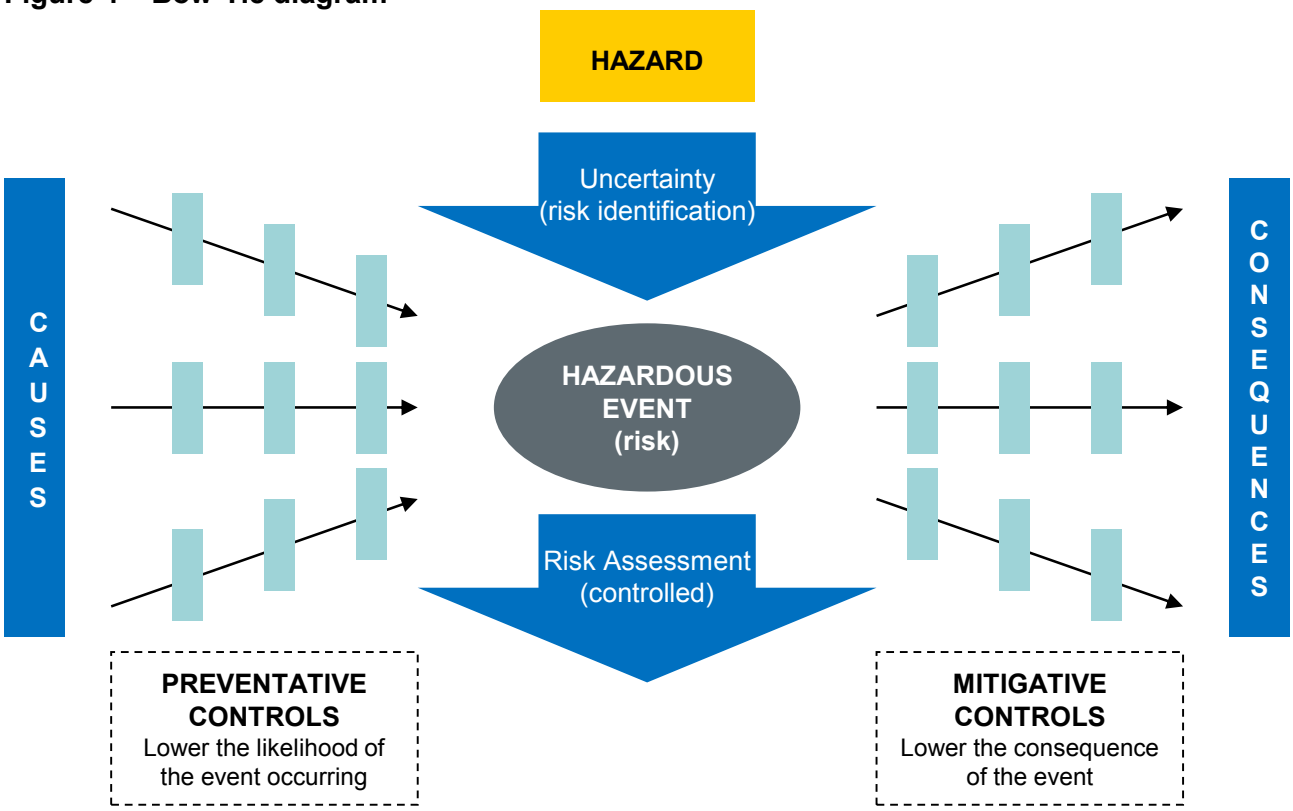
Pathways connecting the individual causes and consequences to the hazardous event will then be drawn, with the primary preventative and mitigation controls placed along each of the pathways, respectively. Primary control weakening factors may also be added to these primary controls to describe mechanisms that may reduce or defeat a primary control's effectiveness. Supporting controls may then be added to show how a control weakening may be detected or prevented.

If the failure of an individual control would result in a significantly weakened control environment, it will be highlighted as a key control.

The results of the Bow-Tie control environment assessment will be reflected in Company Form – Risk Assessment Template and any relevant Bow-Tie diagrams.

For consistency, the Risk Manager will centrally maintain the Bow-Tie diagrams used for the Corporate Risk Management Plan. These Bow-Ties will also be made readily available.

Figure 4 – Bow-Tie diagram



When undertaking a change management risk assessment the first step is to identify all the potential hazardous events that may be triggered by the change, consider any existing controls that might be in place and to risk rate these events using the common Risk Matrix. The change management risk assessment will be documented using Company Form – Change Management Risk Assessment Template.

When undertaking an assessment of the risk associated with management being unable to demonstrate it has fulfilled its Workplace Health and Safety (WHS) duties, refer to Network Fatal Risks – WHS Legal Risk Assessment Guideline contained in the Risk Assessment Training Manual.

The final step in the Bow-Tie process is to identify gaps in the control environment and to assess the overall control effectiveness. Refer to **Table 4** for rating details.

Table 4 – Control environment effectiveness ratings

Descriptor	Rating
Nothing more to be done except review and monitor the existing controls, which are well designed for the risk, address the root causes, and are believed to be effective and reliable at all times.	5 – Effective
Controls are in place, well designed and effective. The operating effectiveness of some controls could be improved or there may be some doubts about their effectiveness and reliability.	4 - Satisfactory
While the design of controls maybe largely correct, in that they treat most of the root causes of the risk, they are not currently very effective. Or: Some of the controls do not treat the root causes even if those that are correctly designed are operating effectively	3 – Poor
Significant control gaps. Either controls do not treat root causes or they do not operate effectively.	2 - Very Poor
Virtually no controls in place and those that are in place have very limited operational effectiveness or are poorly designed	1 - None

5.3.4 Risk analysis

An analysis of each identified hazardous event will be undertaken in a consistent manner using the common Risk Matrix as identified in the Risk Management Policy and Company Form – Risk Assessment Template.

Associated with the common Risk Matrix are consequence criteria that can be used to assess the relative impact on the company associated with Safety impacts, Network impacts, Finance impacts, Compliance impacts, Environment impacts and Reputation impacts.

Note that the 5 levels of consequence described within the common risk matrix should not be used to determine the level of response required to an actual incident. Separate incident response criteria should be established as part of the incident management procedure for this purpose.

The consequence and likelihood criteria expressed in the common Risk Matrix will suit almost all longer term situations, however in the case of assessing the risk associated with a project or program of work, the use of the additional criteria set out in **Table 5** should be considered.

The additional criteria should not be used in isolation but should be used in conjunction with assessments of the main criteria contained in the common Risk Matrix.

Table 5 – Additional criteria for projects

Consequence	Description
Severe	Greater than 50% of Program / Project baseline schedule or budget
Major	Greater than 25%, but less than 50% of Program / Project baseline schedule or budget
Moderate	Greater than 10%, but less than 25% of Program / Project baseline schedule or budget
Minor	Greater than 5%, but less than 10% of Program / Project baseline schedule or budget
Insignificant	Less than 5% of Program / Project baseline schedule or budget
Likelihood	**Description**
Almost Certain	The event has occurred more than once on the majority of similar Projects in the past
Likely	The event has occurred in the majority of similar Projects in the past
Possible	The event has occurred in the minority of similar Projects in the past
Unlikely	The event is known to have occurred on similar projects in the past but only rarely
Rare	The event has not occurred in similar Projects in the past but could

The risk analysis will consider three measures:

1. Inherent risk;
2. Control environment effectiveness; and
3. Residual risk rating.

The inherent risk rating is based on the plausible worst case scenario assuming the absence of company established controls but with the presence of existing external controls such as regulations, road rules etc. and reliance on common sense.

The residual risk is defined as the risk rating based on the plausible worst case scenario with the existing controls in place and operating with the identified control environment effectiveness as at the time of the assessment.

Details of the control environment effectiveness ratings, the inherent risk rationale and risk rating, the residual risk rationale and risk rating will be documented in Company Form – Risk Assessment Template or Company Form – Change Management Risk Assessment Template.

5.3.5 Risk evaluation

Each hazardous event will be evaluated against the company's risk appetite and risk tolerance to determine which risks are tolerable based on their existing controls, and which risks require treatment and the development of Treatment Action Plans. As detailed in Section 5.3.2, a risk is deemed tolerable if it is considered to be:

- "As Low As Reasonably Practicable" (ALARP); or
- Non-ALARP with treatment action plans in place to move the risk to ALARP.

Table 6 provides guidance for evaluating the risk in order to determine its ALARP status.

Table 6 – ALARP status test

Effectiveness of control design	
Do the controls meet regulatory or other mandatory standards? eg have they been applied in accordance with the hierarchy of controls.	Yes/No
Has the nature of the risk changed since controls were implemented, and if so, do the controls still manage the risk effectively?	Yes/No
Are the controls comparable to peers or accepted industry practice?	Yes/No
Operating Effectiveness	
Do the results of monitoring activities tell us our controls are operating effectively, eg are they fit for purpose, suitable for the nature/duration of the work and correctly installed, set up and used?	Yes/No
Have recommendations from recent audits in relation to the controls been implemented?	Yes/No
In recent incident / near miss events, did the controls work as intended?	Yes/No

Below are matters which must be considered when evaluating a health and safety duty:

Has the company considered bringing in other parties with the relevant skills and expertise to advise on the implementation of additional controls to either eliminate, or where not reasonably practicable to eliminate, to then minimise the risk to as low as reasonably practicable?	Yes/No
A "**Yes**" response to the above question and those in Table 6 may indicate that existing controls are working well and no new or revised controls are required and therefore the risk is ALARP. If the response to any of the above questions was "**No**", then ways exist to eliminate the risk, or where not reasonably practicable to eliminate, to then minimise the risk to as low as reasonably practicable.	
Are the cost, effort and resources required to eliminate the risk or where not reasonably practicable to eliminate the risk, to then minimise the risk to as low as reasonably practicable, grossly disproportionate to the likely reduction in either consequence and/or likelihood associated with the hazardous event?	Yes/No
A "**Yes**" response to the above question may indicate that: • it is not reasonably practicable to implement additional controls to either eliminate the risk, or where not reasonably practicable to eliminate the risk, to then minimise the risk to as low as reasonably practicable; and • the hazardous event may have ALARP status. A "**No**" response to the above question may indicate that: • new controls are reasonably practicable to implement; and/or • existing controls require strengthening; and • the hazardous event may have Non-ALARP status.	

Guidance in determining what is reasonably practicable to meet a health and safety duty

Under the s.18 of the *Work Health and Safety Act 2011 (NSW)*, the following is stated in relation to what is "reasonably practicable" in ensuring health and safety:

In this Act, ***reasonably practicable***, in relation to a duty to ensure health and safety, means that which is, or was at a particular time, reasonably able to be done in relation to ensuring health and safety, taking into account and weighing up all relevant matters including:

(a) the likelihood of the hazard or the risk concerned occurring, and

(b) the degree of harm that might result from the hazard or the risk, and

(c) what the person concerned knows, or ought reasonably to know, about
(i) the hazard or the risk, and

(ii) ways of eliminating or minimising the risk, and

(d) the availability and suitability of ways to eliminate or minimise the risk, and

(e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

Further guidance on the above can be found in the following Safe Work Australia publication:
"*How to determine what is reasonably practicable to meet a health and safety duty", May 2013.*

The responses to the ALARP status test questions must be recorded on the relevant risk assessment spreadsheet.

After considering the ALARP status in your workshop/meeting, the risk rating and ALARP status are to be validated with the relevant Risk Owner or Project/Program Sponsor prior to initiating any treatment actions.

To test the rationale of their evaluation Risk Owners or Project/Program Sponsor are encouraged to ask "would our stakeholders be surprised if we announced a loss due to this risk?" Where the answer is "yes", the effectiveness of the existing control environment, along with the options to further reduce the risk should be investigated further.

5.3.6 Risk treatment

When the results of the risk evaluation determine a risk to be Non-ALARP, risk treatment options will be identified and a Treatment Action Plan documented. Risk treatment involves selecting one or more options for modifying risks, and implementing those options. Once implemented, the treatment action provides additional controls or modifies/improves existing controls. Any business as usual activity undertaken to reduce risk is considered an existing control and is not to be included as a treatment action in a risk management plan. Implementation of a treatment action should result in a significantly improved control environment.

Options for risk treatment include:

- avoiding the risk by deciding not to commence the activity associated with the risk;
- removing the source of the risk;
- changing the likelihood;
- changing the consequence;
- sharing the risk with another party eg insurance, contracts and risk financing; and
- retaining the risk by informed decision (hence revising the risk evaluation).

Once a risk treatment option has been identified, it may be necessary to revisit the risk evaluation in order to determine if it is reasonably practicable to implement. The process of determining if a risk treatment option is reasonably practicable may involve some form of cost-benefit analysis which should be developed on a case by case basis.

All Treatment Action Plans will include a responsible manager and due date for implementation. Treatment actions do not necessarily need to have a completion date within the life of the current risk management plan, in many instances, the due date will be in a subsequent year and the treatment action will carry over in the following year's risk management plan.

The Risk Owner or Project/Program Sponsor is required to endorse any treatment actions and in doing so confirms that the necessary resources will be made available to complete the actions within the designated timeframes.

5.4 Monitor and review risk management

The monitor and review phase must be embedded as part of the risk management process, eg it may be necessary to revise controls in the following circumstances:

- where the risk is non- ALARP;
- where a new hazardous event is identified;
- before a change is implemented; or
- where a need is identified following consultation.

Key Risk Indicators will be established for all risks contained in a risk management plan. Where Key Risk Indicator performance declines, corrective actions to restore control should be developed and implemented.

The implementation of Treatment Action Plans provides a risk management performance measure.

Risk Category Owners and/or Project/Program Sponsors are responsible for reviewing and monitoring the implementation of Treatment Action Plans and the status of Key Risk Indicators. In certain circumstances, a change control process may be required for Treatment Action Plans eg implementation date. The process for facilitating this change is outlined in Company Procedure – Changes to Risk Based Management Plans.

The Manager Governance, Risk & Compliance will establish the monitoring and reporting process for all aspects of the Corporate Risk Management Plan, which includes:

- monitoring that controls are in place, maintained and remain effective;
- identifying further options for risk treatment to reduce the risk further;
- monitoring the implementation of Treatment Action Plans on a monthly basis;
- analysing and learning from events and near misses, including the performance of controls;
- monitoring trends in Key Risk Indicator performance;
- detecting changes in the context, both external and internal; and
- identifying emerging risks.

The annual update of the Corporate Risk Management Plan is one of the major review activities undertaken during the year. Assurance over this process is provided as follows:

- Risk Category Owner endorsement of risk ratings, ALARP status, risk treatment actions and key risk indicators for the hazardous events in their Risk Category;
- review and endorsement of the draft Corporate Risk Management Plan by the Executive Leadership Team;
- review of the draft Corporate Risk Management Plans for the three Network companies by the Group Risk Category Owners; and
- review and endorsement of the draft risk profiles by the Executive Leadership Group prior to provision of the Group risk profile to the Audit and Risk Committee for their information.

The Corporate Risk Management Plan is a dynamic document and there may be a need to re-assess particular hazardous events throughout the year in the following circumstances:

- deteriorating key risk indicator trend;
- emerging risk realisation;
- major organisational change;
- major changes in internal/external context; or
- significant changes to legislation.

At the completion of all treatment actions, the ALARP status does not automatically revert to ALARP. A full re-assessment is required to be undertaken to confirm that the hazardous event has moved from Non-ALARP to ALARP. This re-assessment would typically be undertaken as part of the annual update of the Corporate Risk Management Plan. Should the re-assessment be undertaken ahead of the annual update, and this results in a change of risk rating or ALARP status, the existing Corporate Risk Management Plan can be updated following Company Procedure – Changes to Risk Based Management Plans.

5.5 Risk reporting

Risk management performance will be measured, monitored and reported using the following metrics:

- Treatment Action Plan Implementation Status.
- Key Risk Indicator Trend.

Monitoring and reporting of performance on the implementation and effectiveness of controls associated with the Corporate Risk Management Plan will be provided for noting at the respective meetings of the Executive Audit Risk & Compliance Committee (EARCC). A summary report focused on the Strategic Risks, Network Fatal Risks and “High” Non-ALARP Operational Risks will be presented to the Board and the Audit & Risk Committee (ARC).

Risk Category Owners are to provide an update to the EARCC on the status of hazardous events in their Risk Category as per the timetable set by the Risk Manager and endorsed by the EARCC.

In some cases, treatment actions plans may be carried over to the following financial year, which may result in “orphan” treatment actions plans that do not align to a hazardous event as the hazardous events may have been removed. The “orphan” treatment action plans will be reported as carry over items as part of the update provided to the EARCC. If the “orphan” treatment action plan is related to prior a Strategic Risk, Network Fatal Risk or “High” Non-ALARP Operational Risk, it will be reported as part of the summary report presented to the ARC.

Where applicable, risk reports should also be provided to respective governance committees eg Executive Health, Safety and Environment Committee, Project Steering Committees in line with company reporting processes.

Templates for risk reporting are produced by the Governance, Risk & Compliance Branch.

In addition to the above, the identification and analysis of emerging risks will be conducted in conjunction with the company’s strategic planning process.

5.6 Emerging risk reporting

5.6.1 Emerging risk identification

The identification of emerging risk is a continuous process. The company will employ a range of techniques to identify or sense emerging risks with some examples presented in **Table 7**. The need to facilitate a specific emerging risk identification workshop will be at the discretion of the General Manager Finance & Compliance. Otherwise emerging risks should be brought to the attention of the Risk Manager through the sources identified in **Table 7**.

Table 7 – Emerging risk identification sources

Technique	Description
Risk Assessment	Emerging risk identification workshops. Formal risk identification sessions designed to brainstorm uncertainties in the delivery of strategy and the dependability of the underlying business value drivers. This can involve scenario analysis and stress testing of underlying assumptions.
Employee leads	From employees in risk management, eg Divisional GRC representatives, internal audit or strategic planning. May also be identified at Executive and/or Board planning days.
External sources	External consultants and agencies. The assignment of external experts to conduct consultancy activities that provides information on trends, company performance, contextual developments.
Issues survey	A survey of the company employees designed to identify issues that may impact the operation, strategic execution or reputation of the company.

Fundamental to a robust process of emerging risk identification is:

- the risk identification process must challenge the validity and dependability of the core underlying assumptions and business value drivers detailed in the Strategic Plans;
- the ability to draw a relationship between the uncertainty and the Priority Actions of the company, in order to test that the uncertainty is not simply a distraction; and
- the process allows for consideration of unexpected, low-probability events with the potential to have a high-impact on the company.

5.6.2 Risk analysis

Due to their nature, many emerging risks material to the company are high-impact, low probability. As a result, the analysis of an emerging risk will not focus so much on the likelihood of the risk, but on the *speed of onset* of the risk; that is: how quickly (in terms of time) the impact of the risk will be felt by the company.

Speed of onset is an expression of time (as opposed to probability) and is expressed in terms of months.

The analysis of emerging risk will be undertaken on two parameters:

- plausible worst case consequence; and
- speed of onset (velocity).

Table 8 provides a sample of *speed of onset* durations which can be used in the communication of emerging risks.

Table 8 – Speed of onset durations

Speed of Onset	Time
Very rapid	Less than 3 months
Rapid	Greater than 3 months, but less than 12 months
Slow	Greater than 12 months

The consequence will be assessed using the criteria assigned to the company's common Risk Matrix as defined in Board Policy – Risk Management.

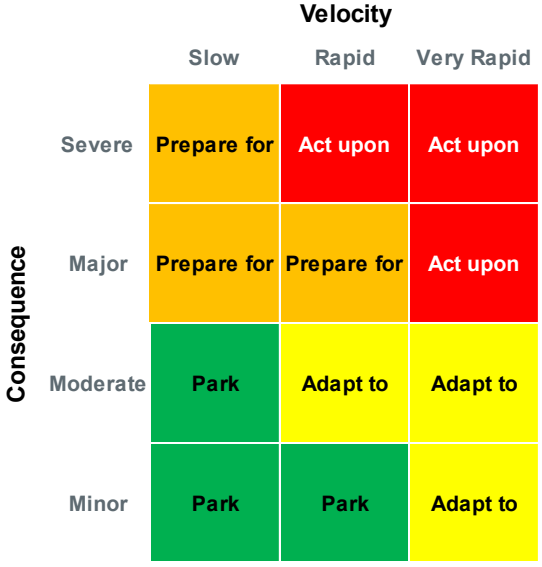
The consequence will be assessed using the criteria assigned to the company's common Risk Matrix as defined in Board Policy – Risk Management.

The analysis of consequence should be supported with a qualitative statement on the magnitude of the impact. This is important, because in some circumstances the magnitude may well exceed the definition of “Severe” contained on the company common Risk Matrix. In addition, it is good practice to include a narrative of the impact in risk reporting.

5.6.3 Emerging risk response

The response to an emerging risk can be one of four actions outlined in **Figure 5** below:

Figure 5 – Matrix for response to emerging risk



Emerging Risk Response

Act upon	Severe/major consequence, high velocity risks are acted upon. Action is taken to directly respond to the risk - strategy &/or plans changed.
Prepare for	Severe/Major consequence low velocity risks - plans are put in place to prepare the business to manage the risk.
Adapt to	Moderate/minor consequence, high velocity risks are adapted too.
Park	Moderate/minor impact, low velocity risks are parked. Not material in impact and travelling with low velocity hence no need to adapt strategy or plans.

If uncomfortable:……
- Do we know enough?
- Is the impact underestimated?
- Could the risk move faster than estimated?

The initial assessment must be validated with the relevant Risk Category Owner before being documented in Company Form – Emerging Risk Register. Where emerging risks with severe or major consequences have been identified, a risk assessment should be undertaken in line with this procedure and Treatment Action Plans developed.

Any Treatment Action Plans should be validated against the *speed of onset* to confirm that the control can be implemented ahead of the expected onset.

5.6.4 Emerging risk reporting

Emerging risks will be reported alongside known risks in the Risk Management Report. When an emerging risk is identified it will be assigned to a risk category.

Emerging risks will be detailed in the Risk Management Report to the EARCC. In preparing the report, the Risk Manager should consider all identification methods. Typically this will involve interviews with Risk Category Owners, or their representatives, focusing on issues identified in recent surveys and any other matters that have the potential to impact delivery of Priority Actions.

6.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Type of Record	Storage Location	Retention Period*
Risk Management Strategic Plan	TRIM	Required as State Archives – as per GA28 section 19.14.01
Corporate Risk Management Plan	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Approved change requests to the Corporate Risk Management Plan	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Final version of bowties	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Final version of Risk Assessment spreadsheets	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Risk Management reports submitted to the EARCC	TRIM	Required as State Archives – as per GA28 section 19.17.02
Risk Management reports submitted to the ARC	TRIM	Required as State Archives – as per GA28 section 19.17.02
Risk management plan	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Project risk management plan	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01
Change management risk assessment	TRIM	Destroy 6 years after date closed – as per GA28 section 19.19.01

* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

7.0 AUTHORITIES AND RESPONSIBILITIES

Chief Executive Officer has the authority and responsibility for:

- approving this procedure;
- demonstrating leadership and commitment to the implementation of the Risk Management Framework across the company; and
- endorsing the Risk Management Strategic Plan.

Executive Leadership Group and **Executive Leadership Team** have the authority and responsibility for:

- allocating resources to maintain compliance with this procedure;

- demonstrating leadership and commitment to the implementation of the Risk Management Framework across the company;
- endorsing the risk ratings and ALARP status of the hazardous events contained in the company risk profile;
- embedding risk management into the key business processes including, but not limited to policy and procedure development, strategic planning, change management and project management processes;
- reporting changes to the risk profile including emerging risks to the company and the Board in line with the reporting criterion defined in this procedure;
- monitoring and reviewing risk management performance, including treatment action status and key risk indicator trends; and
- developing and implementing additional treatment actions to address any significant decline in risk management performance identified through the monitoring.

Group Executive People & Services has the authority and responsibility for developing and maintaining the Risk Management Framework and the Risk Management Strategic Plan.

Group Manager Corporate Governance has the authority and responsibility for:

- consulting with Network companies to develop the Risk Management Framework;
- facilitating Risk Management Reports to the Audit and Risk Committee; and
- undertaking an independent review of the Risk Management Framework on behalf of the Audit and Risk Committee.

Group Manager Health Safety & Environment has the authority and responsibility for confirming the Network Fatal Risk titles and descriptions for inclusion in the annual refresh of the Corporate Risk Management Plan.

Group Risk Category Owners have the authority and responsibility for:

- undertaking risk assessments to support the delivery of the Strategic Plans using the risk management process contained within this procedure; and
- reviewing and endorsing the risk ratings and ALARP status of the hazardous events included in their risk category as provided by the Network companies.

General Manager Finance & Compliance has the authority and responsibility for establishing appropriate governance mechanisms to support the implementation and ongoing management of the Risk Management Framework.

Manager Governance, Risk & Compliance has the authority and responsibility for:

- providing leadership in the development and promotion of a positive risk culture;
- implementing the principles of the Board Policy – Risk Management into the design of the Risk Management Framework;
- implementing the Risk Management Strategic Plan;
- developing and maintaining a Corporate Risk Management Plan to support the delivery of the Corporate Plan using the risk management process contained within this procedure;
- implementing an annual review of the Corporate Risk Management Plan;
- delivery of awareness training and mentoring to continue the development of appropriate risk management skills and competencies in the company;
- establishing the systems and tools to facilitate the risk management process and the implementation of the Risk Management Framework; and
- reviewing this procedure so that it remains current and relevant to the company's needs regularly.

Risk Manager has the authority and responsibility for:

- facilitating the implementation of the Risk Management Framework;
- implementing the initiatives contained in the Risk Management Strategic Plan;
- coordinating with the members of the Executive Leadership Team and their delegates for the development of the Corporate Risk Management Plan;
- coordinating with the members of the Executive Leadership Team and their delegates regarding emerging risk;
- developing mechanisms for monitoring and reporting the company's risk management performance;
- coordinating the collation and assessment of risk performance data and providing regular reports to the Executive Leadership Team and Group Manager Corporate Governance for inclusion in the consolidated reporting to the Audit and Risk Committee;
- maintaining a centralised set of Bow-Tie diagrams to support the Corporate Risk Management Plan;
- maintaining the emerging risk register;
- providing direction and advice on the application of this procedure to Risk Category Owners, Risk Category Nominated Lead and Divisional Governance, Risk & Compliance Representatives; and
- facilitating training sessions on the application of the Risk Management process.

Risk Owners have the authority and responsibility for:

- nominating a subject matter expert to lead technical input to each risk assessment undertaken; and
- endorsing the risk ratings and ALARP status of the hazardous events assigned to them.

Risk Category Owners have the authority and responsibility for:

- reviewing and endorsing the risk ratings and ALARP status of the hazardous events included in their risk category; and
- reporting annually to the Executive Audit Risk & Compliance Committee on the status of the risks in their category.

Divisional Governance, Risk & Compliance Representatives and/or **Risk Category Nominated Leads** have the authority and responsibility for:

- providing support to the division for the implementation of the Risk Management Framework and the Risk Management process;
- providing risk performance data to the Risk Manager, in line with the corporate timetable; and
- liaising with the Risk Manager on matters relating to the implementation or deviation from the Risk Management Framework.

Branch Managers have the authority and responsibility for:

- participating in the development of the Corporate Risk Management Plan as subject matter experts, as required;
- familiarising themselves with the hazardous events contained within the Corporate Risk Management Plan;
- implementing Treatment Action Plans (where relevant) and providing data to monitor trends associated with Key Risk Indicators; and
- communicating and consulting with the relevant Executive Leadership Team member in relation to emerging risks.

Project/Program Sponsors have the authority and responsibility for:

- endorsing the project Risk Management Plan;
- reviewing and endorsing the risk ratings, ALARP status and treatment actions for the hazardous events related to their project; and
- approving the project specific processes for the reporting of material project risks.

Project Managers have the authority and responsibility for:

- complying with the requirements of this procedure when undertaking project risk assessments;
- providing risk performance data to the Project/Program Sponsor; and
- liaising with the Risk Manager on matters relating to the implementation or deviation from the Risk Management Framework for project risk assessments.

Employees have the authority and responsibility for complying with the requirements of this procedure when undertaking risk assessments.

8.0 DOCUMENT CONTROL

Content Coordinator : Manager Governance, Risk & Compliance

Distribution Coordinator : GRC Process Coordinator

ASM-STG-10002

Network Asset Management Strategy

March 2014

Table of Contents

Purpose & Scope

The Network Asset Management Strategy provides an overall view of the approach Ausgrid takes to manage its asset portfolio to achieve business objectives. It describes the key business objectives, and relates them to the key target outcomes of the asset management processes. It describes the nature of the Ausgrid asset base at a high level and the policy level approach to asset management. It describes the key processes in the asset management framework by reference to the appropriate policy, standard and procedural documents.

This strategy covers network assets used to deliver electricity services to Ausgrid's customers. It is not intended to include non-system assets.

Business Objectives

Background

Ausgrid is a New South Wales (NSW) State Owned Corporation constituted under the Energy Services Corporations Act 1995. Ausgrid's main business undertakings are subject to the National Electricity Law and the associated National Electricity Rules. The NSW Electricity Supply Act, 1995 governs many aspects of our business and provides the framework for our distribution licence and the conditions attached to it. Commercially, we operate under a revenue determination made by the Australian Energy Regulator (AER) in accordance with the National Electricity Rules.

The objectives for energy distribution business outlined in the Energy Services Corporation Act 1995 are:

a) *to be a successful business and, to this end:*
    i. *operate at least as efficiently as any comparable business*
    ii. *maximise the net worth of the State's investment in the State Owned Corporation; and*
    iii. *exhibit a sense of social responsibility by having regard to the interests of the community in which it operates.*
b) *To protect the environment by conducting its operations in compliance with the principles of economically sustainable development contained in section 6 (2) of the Protection of the Environment Administration Act 1991.*
c) *To exhibit a sense of responsibility towards regional development and decentralisation in the way in which it operates.*
d) *To operate efficient, safe and reliable facilities for the distribution of electricity of other forms of energy.*
e) *To be an efficient and responsible supplier of electricity and other forms of energy and of services relating to the use and conservation of electricity and other forms of energy.*

Our obligations under the National Electricity Law and Rules are designed to align with the National Electricity Objective:

to promote efficient investment in, and efficient operation and use of,

electricity services for the long-term interests of consumers of electricity with respect to:

- *price, quality, safety, reliability, and security of supply of electricity; and*
- *the reliability, safety and security of the national electricity system.*

Our focus, with respect to investment and expenditure on the operations of our business is also guided by the requirements of Chapter 6 of the National Electricity Rules, which define the capital and operating expenditure objectives that the AER uses to determine our allowable revenue. The objectives are to:

- *meet or manage the expected demand;*
- *comply with all applicable regulatory obligations or requirements;*
- *maintain the quality, reliability and security of supply;*
- *maintain the reliability and security of the distribution system; and*
- *maintain the safety of the distribution system.*[1]

Ausgrid has translated these obligations into three core business objectives in our current business plan:

Continuously improving safety performance with respect to our customers, staff and the public.
Maintaining the reliability and sustainability of the network.
Containing average network tariff increases to CPI for our customers.

Relationship between business objectives and asset management outcomes

Ausgrid's asset management approach is intended to deliver on these key business objectives. The application of our asset management principles and processes deliver the outcomes that ensure the long term safety, reliability and efficiency of our network operations.

The key outcomes of our asset management system are described below. While all outcomes contribute to each of our key business objectives at some level, the table identifies where the most significant contributions lie.

[1] Paraphrased for clarity

Outcome	Safety	Reliability and sustainability	Cost to consumers
Assets added to our network are fit for purpose, the most economical choice on a life-cycle basis, and clearly specified.	✓✓	✓✓	✓✓✓
Assets in service are monitored and maintained in accordance with properly developed maintenance plans.	✓✓	✓✓✓	✓
Asset management plans are regularly reviewed using multi-factor risk assessment including safety, environmental, reliability and financial risks.	✓✓✓	✓✓✓	✓✓✓
Maintenance practices are kept efficient by a review cycle that ensures continuous improvement.	✓	✓	✓✓✓
The effective economic life of assets is maximised by using condition based decision making.	✓	✓	✓✓✓
Performance and condition data is collected and recorded to enable future analysis in support of robust decision making.	✓	✓✓✓	✓✓
Asset disposal is recognised and managed as part of the replacement process.	✓✓	✓✓✓	✓

The Ausgrid Network

In 2012/13, Ausgrid's network supplied more than 26,316GWh of electricity to more than 1.64 million network customers. Our distribution area (Figure 1) covers an area of 22,275 square kilometres and includes some of the most densely populated of NSW. We supply customers from the Upper Hunter Valley in the north, Waterfall in the south, and west in Sydney to Auburn.

Figure 1 – Ausgrid's Distribution Area

Ausgrid's network includes:

- a dual function (transmission) system of 132kV assets;
- a sub-transmission system of 33kV, 66kV and 132kV assets;
- a high voltage distribution system of 5kV, 11kV and some 33kV assets; and
- a low voltage distribution system of 230V and 400V assets.

Ausgrid operates an extensive network of 132kV assets which are directly connected to TransGrid's NSW main transmission network. Where these 132kV assets are operated in parallel and provide transmission services to support TransGrid's network they are defined as dual function assets under the NER. Ausgrid is therefore

also registered as a Transmission Network Service Provider. Dual function assets are regulated by the Australian Energy Regulator (AER) as if they were part of the distribution system for the purposes of revenue and are subject to the economic evaluation, and public notification and consultation requirements of the Regulatory Investment Test for Distribution (RIT-D).

Figure 2 – Typical components of the electricity network

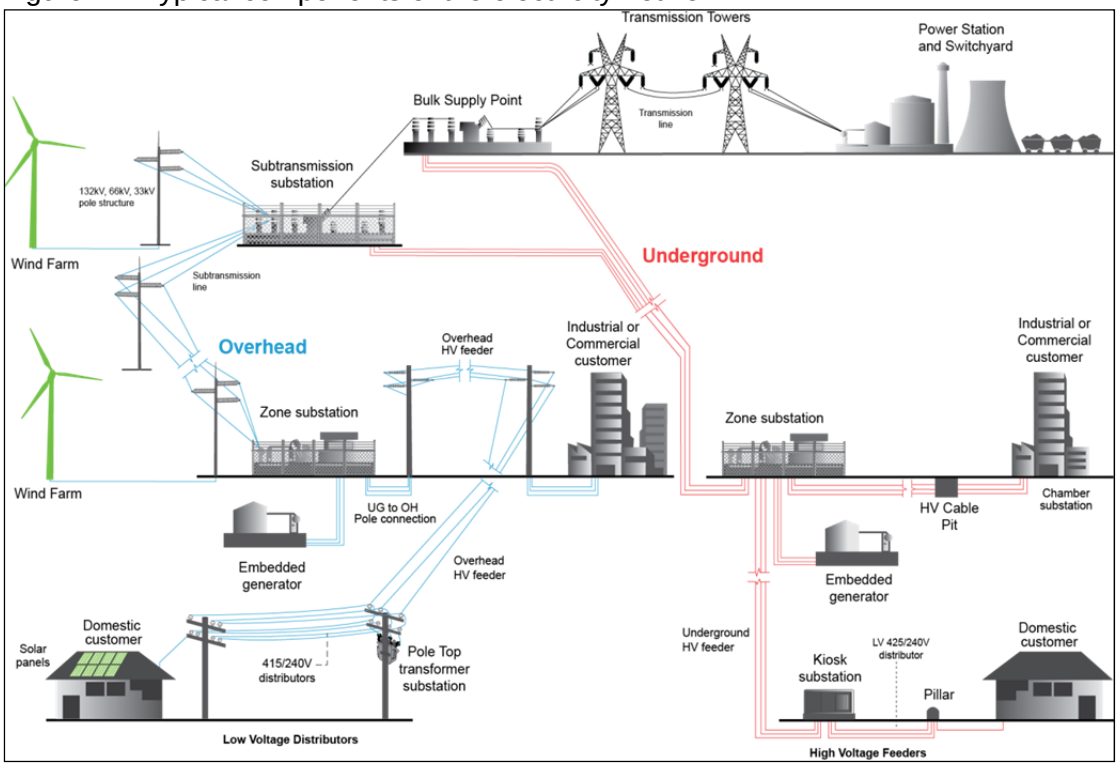


Figure 2 above shows Ausgrid's typical distribution network arrangement. Power is generally supplied through the TransGrid statwide transmission system, and distributed via Bulk Supply Points into the sub-transmission network. Other electricity distributors' networks and some power stations are also connected into our distribution network.

Ausgrid's network has a current day replacement value of approximately $38 billion and has been developed over the past 80 years. The main dimensions of the network are shown in the table below.

Table 1 – Ausgrid network statistics

Distribution Network Assets	2012/13
Dual Function (Transmission) System – 132kV (km)	789
Substations - Sub-transmission	42
Sub-transmission System - 33kV, 66kV and 132kV (km)	3,534
Substations - Zone	192
Substations - Distribution	31,070
High Voltage Overhead - 11 kV and 22 kV (km)	10,117
High Voltage Underground – 11 kV and 22 kV (km)	7,822
Low Voltage Overhead – 400V (km)	13,060
Low Voltage Underground – 400V (km)	5,638
Feeder Numbers CBD	55
Feeder Numbers Urban	1,733
Feeder Numbers Short Rural	287
Feeder Numbers Long Rural	4
Pole (number)	514,190
Streetlights (number)	253,881

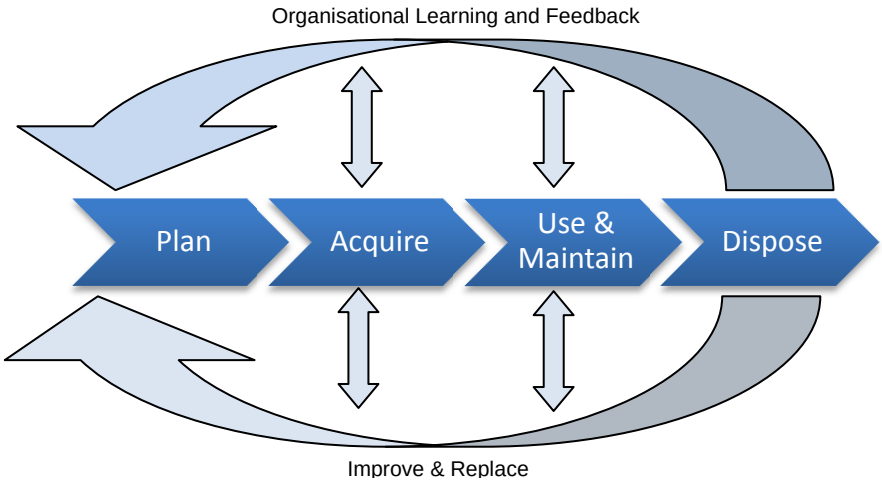
Asset Management Approach

Electricity networks are highly capital intensive businesses and asset management is core to Ausgrid's business. Asset management can be defined as *"The lifecycle management of physical assets to achieve the stated outputs of the enterprise."*[2]

Ausgrid has an organisation-wide focus on asset management, including design, procurement, maintenance activities, asset renewal, capital investment, condition monitoring and continuous improvement. Our asset management approach enables the competing requirements of the network to be optimised through the systematic consideration of risk and is supported by an integrated asset management system.

The Asset Management framework adopted by Ausgrid recognises four distinct but overlapping phases in the asset life cycle, as depicted in the simplified model at Figure 3. This model is similar to that adopted by many other asset intensive businesses and is consistent with the elements of a total asset management system identified in the New South Wales Government's Total Asset Management Policy.

Figure 3 - Asset Management Model



The key phases and major associated processes are:

1) Identification of the need for an asset (Asset Planning - Concept and Specify).

Business planning and analysis leading to a business case are the key processes. These provide the economic justification for the acquisition or improvement of an asset, or in some cases the adoption of another, non-asset solution to meet the business requirement. This phase is substantially embodied in Ausgrid's network investment policy framework.

2) Provision of the asset, including its refurbishment (Acquisition).

This includes the specification of requirements, systems engineering, project

[2] Asset Management Council – www.amcouncil.com.au

management and delivery, and quality assurance. These processes verify and validate the final design / delivered product against the specified requirements. Additional processes ensure that project objectives are achieved with minimum risk.

3) Operation of the asset, including its maintenance (Use and Maintain).

Many of the activities performed within this phase rely directly on the planning and analysis carried out during the acquisition phase, (or equivalent planning for existing assets). These include determining maintenance and support requirements through the application of specialised analysis techniques; and providing documentation, training and facilities to support maintenance and repair actions.

This phase covers all routine and programmed maintenance as well as developing and implementing engineering changes and improvements to either enhance asset performance or to reduce costs, or both. A key element of the asset management task during this phase is engineering management, particularly the documentation of asset configuration and control and approval of engineering changes.

Ausgrid's processes cover a set of systems and procedures for engineering and maintenance management, as well as information support systems, enabling managers to plan and control workload and to evaluate results. Cost information relating to individual assets is a key element in the ongoing analysis of performance and forms an integral part of the organisation-wide continuous improvement process.

4) Disposal, and thus effective removal of the asset from Ausgrid's portfolio.

Requirements for disposal of obsolete or replaced assets are incorporated in the planning for new assets, to ensure that a superseded item and support provisions are removed from service at the earliest possible time, thereby minimising management and storage costs and impact on the value of inventory. The costs of disposal are included in the investment decision.

Disposal activity can have an important bearing on safety and continuing support costs, as well as significant implications for environmental and/or heritage management.

Investment Decision Making

The key asset management processes determining outcomes in the PLAN, ACQUIRE and DISPOSAL phases are described in Ausgrid's network investment policy framework. All assets on the Ausgrid network are initially created through these policies and standards.

Policy or Standard	Scope
Network Investment Policy (INV-POL-10001)	This policy defines the principles by which Ausgrid decides to invest in its electricity system. It covers legislative requirements and investment objectives; decision making processes and criteria; and processes to ensure these decisions are made in a consistent and transparent manner. The policy framework divides investment decision making processes into investment categories that are described more fully in a series of planning standards.
Area Planning (INV-STD-10019)	This standard relates to the development of Ausgrid's Area Plans. Area Plans relate to major investments in the network, and consider Ausgrid's obligations holistically (irrespective of network type, voltage or the investment driver). The majority of investments within the Area Plans are sub-transmission investments due to the greater interconnectivity of the network at this level and because these investments are generally complex and high value. It is common, however, for a major project to include components of distribution work.
Replacement Planning (INV-STD-10035)	This standard relates to investment decisions aimed at managing the risks associated with age and condition of network assets (excluding metering and street lighting), or that would otherwise affect the safe, sustainable and reliable operation of the network, and specifically to decisions to replace or modify existing assets. Where solutions might form part of a strategic investment addressing multiple drivers, especially for subtransmission assets, the investment decision is made within area planning. Replacement planning includes proactive programs of work covering multiple smaller individual investments, and reactive investments resulting from inspection processes or in-service failures.

Policy or Standard	Scope
Distribution Planning (INV-STD-10036)	This standard specifies the requirements when planning investment in the high voltage distribution network, which is typically 11kV (but may also be 33kV and 5kV). It outlines the criteria used to identify needs and compare alternative investment solutions. Investments may be initiated to address general load growth, provide adequate quality of supply or to ensure voltage is within limits.
Low Voltage Planning (INV-STD-10034)	This standard specifies the requirements when planning the low voltage network (i.e. distribution substations and 400V network) to address general load growth, provide adequate quality of supply and ensure voltage is within limits. The low voltage network extends from the high voltage connection at each distribution centre to the point of common coupling with the customer.

Other categories of investment include:

Customer Connections - initiated by an application for a customer connection.

Metering - determined through an annual review of metering, system capabilities and compliance obligations.

Investments focussed on maintaining the reliability of the network are described under a separate policy framework.

Policy or Standard	Scope
Network Reliability Policy (INV-POL-10009)	This policy defines the principles and approach by which Ausgrid decides to invest in projects for improving the reliability of supply. It covers legislative requirements and investment objectives, and describes the constituent components of the Reliability Investment Plan.
Reliability Planning: Feeder Category (INV-STD-10028)	This standard outlines how Ausgrid manages reliability performance at the average feeder category level, in accordance with clauses 15, 18.2, 18.3 and Schedule 2 of the Licence Conditions. It specifies the requirements for establishing targets, and identifying gaps between the forecast performance and the targets to determine when investment is required; documenting the plan and reporting on performance.

Policy or Standard	Scope
Reliability Planning: Individual Feeders (INV-STD-10027)	This standard outlines how Ausgrid manages reliability performance for individual distribution feeders, in accordance with clauses 16, 18.4 and Schedule 3 of the Licence Conditions. It specifies the requirements for investigating and reporting on the reliability performance of individual feeders; determining when investment is required; and documenting the plan.
Reliability Planning: Individual Customers Receiving Poor Reliability (INV-STD-10031)	This standard relates to the management of reliability performance for individual customers. It specifies the requirements for Investigating and reporting on the reliability performance of individual customers at the distribution feeder section level; determining when investment is required; and documenting the plan.
Reliability Planning: Wide Area Outage Management (INV-STD-10030)	This standard outlines how Ausgrid manages the risk of wide area outages based on analysis of major events. These outages have the potential to affect large numbers of customers and/or critical infrastructure. The management of these outages is driven by risk mitigation that considers the broader impacts of such events on the community. This Standard specifies the requirements for assessing the risks; planning mitigating investments; and documenting the plan.
Reliability Planning: STPIS (INV-STD-10029)	This standard specifies the requirements for developing the Service Target Performance Incentive Scheme (STPIS) component of the Reliability Investment Plan, initiating projects that respond to the STPIS incentives and the reporting and target setting requirements for managing the STPIS. It specifies the requirements for establishing STPIS targets and incentive rates; planning investments to respond to the incentive; documenting the plan and reporting on performance.

Asset Support Analysis

Supportability analyses provide the essential linkage between the *ACQUIRE* and the *USE AND MAINTAIN* phases within the asset life cycle.

Supportability analysis forms an integral part of the systems engineering approach to asset development and acquisition. It begins with the specification of key parameters which will influence the operational availability, maintenance and support costs for the asset. At Ausgrid, these requirements are written into tender specifications to ensure suppliers identify the initial requirements for spares, maintenance and support at the outset. Supportability requirements for new assets are described in Network Standard NS212 Integrated Support Requirements for Ausgrid Network Assets.

Design, operational and maintenance standards form part of ongoing asset

supportability. These are captured in Network Standards that cover a wide range of technical issues and practices.

Maintenance Planning

The planning and management of maintenance is the key activity in the *USE AND MAINTAIN* phase of the cycle.

Maintenance is an essential element of the asset management process that makes a direct contribution to achieving the business objectives of the organisation. In particular, a cost effective maintenance program is essential to ensure the long term sustainability of the network by preserving the engineering integrity of assets and their continued fitness for use within the electrical system. This in turn supports the reliability performance of the network, directly manages the safety risk profile and minimises long term costs.

Ausgrid utilises a Condition Based Maintenance approach to monitor the condition of assets, determine asset risk, specify the maintenance requirements and ultimately inform the replacement decision at end of life. This process commences when assets are first introduced to the network and continues cyclically over the life of the asset.

Establishing the set of programmed maintenance requirements is a key element of the management process for all assets. This is aimed at establishing what actions must be put in place to maintain the asset in satisfactory condition during its service life. It also provides the basis for determining financial and technical support requirements for the asset in the form of training, spares, tools and support equipment as well as data collection and analysis requirements for managing and monitoring the cost effectiveness of the maintenance program. Maintenance Requirements Analysis is the process Ausgrid applies to maintenance planning.

Maintenance requirements analysis

Maintenance Requirements Analysis provides a systematic method of determining the most appropriate and cost effective maintenance actions for individual assets, based on an assessment of the failure characteristics of the item, past failure history, the effects including costs of individual failures and the potential effectiveness of the maintenance task. The analysis is documented to provide a permanent record of the basis for decisions and to support the requirement for periodic review of the scope and effectiveness of maintenance action. The process is described within the Maintenance Requirements Analysis Manual (ASM STG-10005).

Maintenance requirements cover both short term actions, designed to detect or prevent a specific mode of failure as well as major renewal decision points to counter the effects of long cycle deterioration. Maintenance requirements for an asset may include preventive tasks to be done at some specified frequency or inspection or condition monitoring tasks, designed to establish the condition of the asset and to determine the need for corrective work based on this condition.

Failure Modes, Effects and Criticality Analysis (FMECA) provides a structured method for assessing the likely causes of failure for an asset and the consequences of these failures on safety, asset performance and economics. This information is

then used to:

- Provide a basis for the maintenance requirements and expenditure forecasting process.
- Provide an input to the safety analysis and thus to initiate corrective action for failure modes which have an unacceptable impact on safety standards for the asset in use.

The data and information developed in the FMECA process is used to inform a Reliability Centred Maintenance approach to decision making regarding maintenance tasks, periodicity and repair / replace choices.

Manufacturer's recommendations and previous history for the same or similar assets typically set the baseline for maintenance requirements. Once the asset enters service its maintenance requirements are progressively refined and improved using recorded asset performance and actual maintenance costs.

Programmed maintenance requirements are consolidated in Network Technical Maintenance Plans (NTMPs) issued for major assets. These NTMPs document the approved scheduled maintenance program for the asset and represent the basis for maintenance programming and management. NTMPs incorporate service and maintenance standards, which provide more detailed information on the actions to be performed on individual assets.

As assets approach the end of their economic life, maintenance analysis identifies an asset as a candidate for end-of-life replacement, and underpins the risk analysis that informs a decision to invest in replacing or otherwise dealing with the retirement of the asset – returning to the *PLAN* phase of the asset management cycle.

Approved by Pamela Henderson, Chief Engineer

Approved 27 March 2013

Overview

Replacement and Duty of Care Plans

2015–19 regulatory period

Executive Summary

Ausgrid's proposed capex of $1.57 billion in Replacement and Duty of Care programs for the 2015-19 period is aligned to achieve our business purpose to efficiently distribute electricity to our customers in a way that is safe, reliable and sustainable. Our substantial program recognises the legacy of investment in the 1950s to 1970s and confirms we face an uphill battle in addressing condition issues associated with a large, old and degraded network. At the same time we have sought to minimise prices for our customers by looking at efficient ways to defer and limit capex in the period.

We are proposing total capex of $1.57 billion for the 2015-19 period for our Replacement and Duty of Care plans. This includes:

- $1.25 billion to address assets that pose an unacceptable level of risk as a result of degraded condition or increased probability of failure (Replacement Plans).
- $324 million to address assets that do not meet compliance and infrastruture risk obligations not covered under the Replacement Plans (Duty of Care Plan).

The plans set out capex to replace, refurbish or modify our existing network assets. For the 2015-19 period there is a shift in focus from transmission assets to distribution assets.

The proposed capex for the 2015-19 period is 41 percent higher than the actual capex during the 2010-14 period (actual for 2010 - 2013 plus planned for 2014) and the two primary reasons for this are:

- In the last period, we deferred a significant portion of forecast capex on Replacement and Duty of Care plans due to a range of delivery issues associated with our total capex program. In light of these difficulties we focused on our immediate obligation to meet compliance, reliability and performance licence conditions, and sought ways to defer the forecast program of works in our Replacement and Duty of Care plans by applying risk tradeoff methodologies.
- Consequently, the age and condition of the assets in these areas of the network has progressively worsened during the 2010-14 period despite investments to remove the most risky assets. This has lead to an increased risk profile for the deferred work. Distribution assets, as a whole, have continued to deteriorate leading to increased risk and increased failures. If unaddressed, these issues may lead to an increase in safety and environmental harm, and will prevent us from meeting our obligations as an essential service provider.

Despite these issues, our program of works recognises that we need to minimise price pressures for our customers to the fullest extent possible during the 2015-19 period. Ausgrid has sought all opportunities to defer capex by prioritising our program within acceptable risk boundaries, and by seeking cost efficiencies in our Replacement, Duty of Care and, Maintenance solutions.

Introduction

The assets used to run an electricity network can carry significant risk to the community, our workers and the environment. For this reason Ausgrid has a strong asset management culture. Our key aim is to balance these risks to ensure we meet our regulatory obligations. Where economically prudent this may involve capex to replace, refurbish or modify assets.

The purpose of this document is to provide a high level overview of our proposed capex for the 2015-19 regulatory control period for Replacement and Duty of Care plans. The overview should be read in conjunction with the "Library of Supporting Documents". Our Replacement and Duty of Care plans are based on the following network asset types:

- All assets on our distribution network including distribution substations, lines and cables.
- Smaller independent assets on our transmission network within our existing transmission and zone substations, and parts of our transmission lines and cables.

In the sections below we identify why Ausgrid is required to replace network assets in our role as an essential service provider. We then describe the difference between our plans, noting that Replacement plans are for assets in degraded condition. Lastly, we describe the key asset categories included in our plans.

What about large sub-transmission assets?

Replacement of major assets on the sub-transmission network (such as zone substations and entire transmission lines) are contained in our Area Plans. This is due to potential synergies in addressing capacity and replacement at the same time in an area. Further information is contained in our Area Plans.

Why do we replace assets?

As an essential service provider, Ausgrid has a strict obligation to manage our assets to meet safety and reliablty standards set by legislation, government, regulations etc. Our asset management principles are focused on ensuring we meet these obligations at least cost, and may include replacement where economically prudent. In the following sections we:

- Identify our key regulatory obligations that influence our asset management decisions.
- Set out our asset management principles, and the types of work we undertake to meet our obligations.
- Identify the conditions under which we consider incurring capex on Replacement and Duty of Care activities.

Regulatory obligations

We have a suite of regulatory obligations that guide our asset management practices. These obligations relate to keeping our network safe, reliable and sustainable and to do so in an environmentally responsible manner. The key obligations are:

- Public and workplace safety - There are inherent dangers of operating electricity networks. When assets fail in service they can cause serious harm to customers, the community and our workers. Key

examples include fires, and explosions, and electricity shocks. Compliance with our obligations requires us to keep our assets in good order so that we do not harm the public or jeapordise the safety of our workers.

- Environment - Our network footprint spans areas of NSW which are highly sensitive to environmental damage. Electricity assets may contain hazardous substances or material that can be unsafe to the environment if not functioning properly. These substances are necessary to assist electrical assets in performing their function i.e. insulation material. However, exposure of these substances can harm the environment. For example, the fluid used to insulate electricity cables can leak and cause damage to waterways such as the Sydney Harbour. For this reason, legislation as well as Ausgrid's own corporate responsibility requires us to ensure that environmental risk is properly managed.

- Reliability – Our Design, Reliability and Performance (DRP) licence conditions recognise that customers expect a reliable supply of electricity. When assets fail, it may cause disruption to the supply of customers, particularly in cases where there is limited redundancy (back-up of supply) in the network. If failure rates increase due to asset degradation, then supply reliability may decrease. Ausgird aims through its Replacement plans to maintain reliability levels by preventing increases in failure rates.

In most cases our obligations do not provide specific actions or measurable standards for compliance. For example, the Workplace Health and Safety Act provides for a general requirement to ensure the health, safety and welfare at work of all of our employees and non-employees. The general nature of this requirement means that we must use prudent judgement based on risk methodologies when designing, maintaining, operating or replacing a network.

In some cases, our obligation does specify a particular standard we must achieve to be compliant. For example, we are subject to various regulations, standards and guidelines for our assets which set out the minimum obligations. In these cases, we will comply with the particular specification.

Asset management strategy

Ausgrid has a comprehensive and prudent strategy to manage assets across our network. The key principles underlying our asset management strategy include:

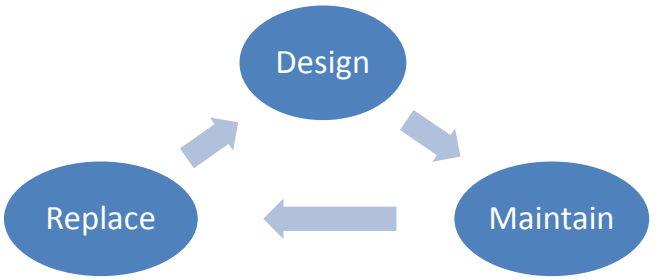
- Ensure compliance with all relevant safety, environmental and reliability obligations.
- Maintain current levels of safety, security and reliability.
- Create a network that is sustainable and stable over the long term.
- Cost effectiveness and efficiency.

In meeting these principles, we have developed a number of diagnostic tools to monitor the health of our network assets. We undertake assessments of technology types on our network, and identify key markers of health such as age of assets, failure history, failure modes (i.e. reasons for failure), failure rates and failure consequences.

We monitor the legislative environment, to verify our existing assets are capable of meeting the current required performance standards. This recognises that new compliance obligations often arise after the asset has been installed. A key example is recent regulations that require the development of greater security to protect infrastructure from sabotage.

Based on our information, Ausgrid develops activities directed at meeting our obligations utilising a well established philosophy called 'Reliability Centred Maintenance' (RCM). At its core, the philosophy seeks to achieve economic efficiency in meeting our regulatory obligations to provide a safe, reliable and sustainable network in an environmentally responsible manner. This involves adopting a whole of life perspective. This is depicted in the following diagram, which shows our asset management practices involve design, maintenance and replacement programs.

Designing and installing assets that perform to their stated function.



Developing optimal maintenance programs that prevent or correct failures of assets.

Replacing, refurbishing or significantly modify assets that no longer allow efficiently provide a safe, reliable or sustainable network.

In particular, Ausgrid's maintenance strategy aims to maximise the life of its assets through cost effective maintenance tasks. This life cycle view ensures that costs to consumers are minimised over the long term by putting in place strategies that optimise the whole of life cost potentially including deferring the need for replacement. However, as explained in the next section, in cases where failures can no longer effectively or safely be mitigated through maintenance, options such as replacement, refurbishment or modification are investigated to mitigate against potential failures.

When we choose to replace assets

Ausgrid replaces assets when it is economically prudent to do so. By addressing the whole of life cost Ausgrid ensures that our strategies are cost effective. For example, we will replace assets where:

- The asset fails in service, and it is not cost effective to remediate the fault. This is called reactive replacement and will occur as a result of deterioration in the condition of assets as they age, or a failure in the technical design of the asset.

- There is significant risk in meeting regulatory obligations by keeping the asset in service. This is called 'proactive' or 'planned' replacement. In these cases, we undertake risk assessments to evaluate whether replacement is required and conduct engineering and financial analysis to determine the timing and scale of the replacement.

In cases where there are large number of assets in the population, it is impractical to undertake detailed examination of risks of individual assets. In these cases asset technology types and vintages can be used to determine a risk profile for the entire population.

Chapter 3 provides more detail on the methodology we have used to identify assets that need to be replaced, refurbished or significantly modified in the 2015-19 period. More information on the difference between reactive and planned replacement is provided in breakout box 1.

Box 1: Reactive vs. Planned replacement

If economically prudent and if the risk of failure can be tolerated, Ausgrid will undertake reactive replacement of its assets. In other cases, Ausgrid proactively replaces, refurbishes or significantly modifies assets before failure. Planned replacement is prudent when we have evidence to suggest that keeping the asset in service exposes us to an unacceptable level of risk that compromises our regulatory obligations.

In making a decision as to whether we run the asset to failure we consider whether:

- The risks can be mitigated cost effectively through inspection, routine or corrective maintenance.

- The consequence of running the asset to failure will breach our regulatory obligations. In particular we consider whether this would be above the level of risk that a prudent DNSP would be willing to accept in our circumstances.

In particular, Ausgrid treats safety as our number one priority, and the majority of our planned replacement is directed at replacing assets that are unsafe to the public and workers. For instance, when the probability of an asset causing a fire reaches an unacceptable level, then proactive action should be taken to mitigate the risk. Using the hierarchy of controls, in some cases, eliminating the risk is achievable by replacing the asset. For example, replacement of oil filled circuit breakers with vacuum interrupted circuit breakers.

What types of capital plans do we develop for replacement?

Ausgrid has two types of plans for identifying our capex requirements.

- Replacement plans relate to assets that pose an unacceptable level of risk as a result of degraded condition or increased probability of failure.
- Duty of Care plans to rectify assets that do not meet compliance standards.

Replacement plans

The majority of our replacement requirements are for assets that have exceeded their technical life. As an asset ages its condition deteriorates, leading to a higher probability of failure. Further, the failure mechanism becomes unpredictable in nature, and becomes difficult to mitigate through maintenance programs. As noted in Chapter 2, Ausgrid has a significant population of assets that exceed their technical life and whose risks cannot be managed through maintenance programs.

In other cases, the reason for replacing the asset relates to a fault with the equipment that is not directly related to age, such as design, manufacturing or installation issues.

It is worth noting that some younger assets deteriorate much faster than older assets due to their design or the environment they operate within. Therefore, asset condition is the primary trigger for replacement, while age is used as an indicative measure. For example, CONSAC & HDPE cable is not the oldest distribution cable on the network. However, over 70% of all distribution underground cable failures can be attributed to CONSAC and HDPE. This is due to their design, resulting in a much quicker deterioration rate and increased safety risk.

Ausgrid develops Replacement plans based on technology types for our major assets, not generic age/standard life. Our planned Replacement plans identify technology that we consider needs to be removed from the network as a result of our risk assessments. Where asset condition can be directly linked to age (degradation), age is used to support the investment decision. Our reactive plans are a forecast of the assets that will fail on the network despite our alternative strategies or an acceptance that run to failure is the optimum strategy.

Duty of Care plans

Duty of Care programs are specific programs of work, unrelated to degradation of the asset , which ensure that Ausgrid's assets comply with specific statutory requirements and standards expected of a prudent DNSP. They relate to new obligations that did not exist when the asset was built, or changes in circumstances that cause the assets to pose unacceptable risks to either staff or the public. For example, we have a Duty of Care obligation to address asbestos and other Workplace, Health and Safety (WHS) and environment risks. Duty of Care programs are also categorised by one of the following risk drivers:

Type of program	Description of programs
Workplace Safety	Programs to mitigate against the risk of workplace safety incidents such as covering some exposed electrical assets and rectification of assets to meet statutory requirements.
Public Safety	Programs to mitigate against the risk of public safety incidents such as installation of anti-climb devices on towers and substation fencing.
Environmental	Programs to ensure compliance with environmental regulations and to mitigate against environmental incidents such as oil containment installation and the replacement of noisy transformers.
Fire Mitigation	Programs to ensure compliance with applicable regulations and to mitigate against fire related risks such as the installation of fire stopping and smoke detection systems.
Asbestos Management	Programs to ensure compliance with applicable regulations regarding asbestos such as the removal of asbestos in cable pits, fire doors and other locations where found.
Security Management	Programs to ensure compliance with statutory requirements regarding the security of sites deemed to contain critical infrastructure.

What types of assets are covered in the plans?

All of Ausgrid's programs, whether reactive or planned, are categorised into one of six asset groups. This assists with managing a large and diverse range of assets These groups are also used to analyse our maintenance expenditure.

These categories allow us to create strategies for groups of assets based on factors such as technology type and operating environment. For example, underground distribution cables are categorised differently to underground sub-transmission cables. Placing them in the same category would ignore differences in technologies, operating environment, maintenance requirements network configuration requirements/risks and consequences, for example reliability implications on sub-transmission assets versus distribution. Similarly, although there are some 11kV circuit breakers common to both distribution substations and zone substations, they are categorised differently to account for the different operating environments and risks associated with each.

Transmission Overhead

Transmission Overhead assets include steel towers, poles (wood, concrete and steel), special termination structures, overhead mains (132kV, 66kV and 33kV), access tracks and air break switches. These assets provide direct connections between Transgrid and and the Ausgrid network and interconnection between our Transmission and Zone substations.

Transmission Underground

Transmission Underground assets include underground cables, of a variety of insulation technologies operating at design voltages of 132kV, 66kV and 33kV, associated pressure monitoring and alarm systems, cross bonding systems, and cable tunnels. These assets provide direct connections between Transgrid and and the Ausgrid network and interconnection between our Transmission and Zone substations.

Transmission Substations

Assets include buildings, transformers, high voltage switchgear, protection systems and earthing systems. These substations are supplied at 132kV or 66kV, and supply local zone substation networks, mostly at 33kV, with smaller 66kV networks in the upper Hunter Valley and in Sydney at Epping/Hunters Hill.

Zone Substations

Assets include buildings, transformers, high voltage switchgear, protection systems and earthing systems. These substations are supplied at 132kV, 66kV or 33kV, and transform this to 11kV (with a small 5kV network) which supplies the local distribution network via overhead / underground mains.

Distribution Mains

Assets include but not limited to poles and other support structures (wood, concrete, steel and composite materials), overhead and underground 11/22kV and Low Voltage conductors, access tracks, overhead and underground services, pillars, reclosers and sectionalisers, voltage regulators, air break switches, under slung links and other equipment. These assets provide connection between Zone substations and customers via distribution substations and the LV network.

Distribution Substations

Assets include pole substations and ground type substations including kiosks, outdoor enclosures, chambers and underground structures. These substations are supplied at 11kV and transform this to 415V. The main assets associated with these substations are buildings, housings, enclosures transformers, high voltage and low voltage switchgear, fuses and earthing systems.

Benefits from previous investment

During the 2010-14 regulatory period Ausgrid made significant inroads into addressing condition and compliance issues on our network. Assets which posed unacceptable risks were replaced with modern day equipment. Our program of works varied significantly from our initial forecast as a result of improved data to inform our prioritisation processes, the development of more cost effective solutions and some delivery issues.

The purpose of this section is to identify the outcomes of investments during the 2010-14 period and the reasons for variations to forecasts. Examination of previous capex can provide insights into the proposed capex for the 2015-19 period, and the veracity of previous forecasting approaches.

In the sections below, we provide information on:

- Why Ausgrid proposed substantially higher replacement allowances in the 2010-14 regulatory period. We demonstrate that insufficient expenditure allowances in the 1990s and early 2000s resulted in the need to undertake significant replacement of assets.
- The benefits to our customers, workers and environment from replacing degraded assets on our network in the 2010-14 period.
- The reasons for variations to forecast.

1.1 Circumstances prior to regulatory period

Figure 1[1] provides an illustrative view of our business lifecycle, and shows the underlying reasons why Ausgrid needed to increase its rate of replacement in the 2010-14 period. While this graph shows mains and poles assets only, the diagram is reflective of the overall network.

In the diagram, it can be seen that a large proportion of Ausgrid's asset base was built in the 1960s, coninciding with a large increase in the demand for electricity. The assets built in this period had significant capacity to provide the backbone of supply for the next 40 years. Investment declined on the relatively young network between 1970 to 2000 as there was less focus on the need for a balanced long-term replacement strategy, routine and preventative maintenance.

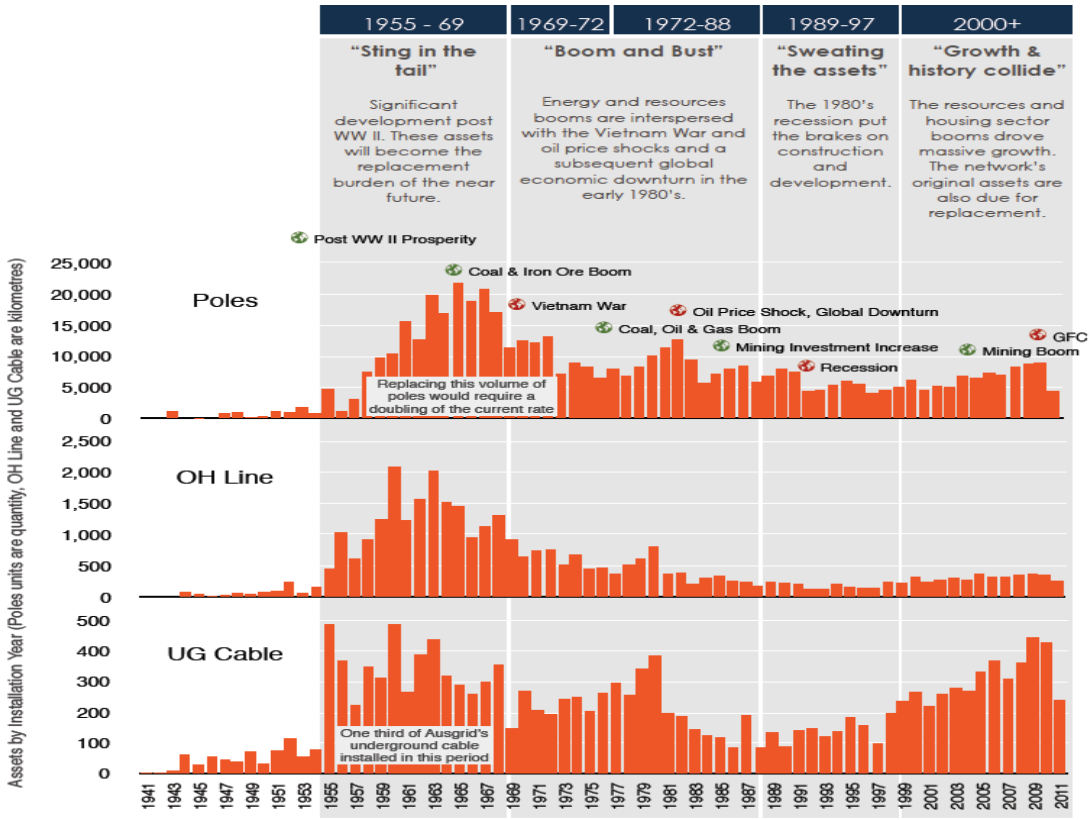
In the early 2000s Ausgrid's analysis demonstrated that the network was potentially facing an impending health issue that would impact our ability to meet reliability and safety in the medium term. The assets that were installed in the 1960s were approaching the end of their technical life, and failures had started to increase on a variety of assets. We recognised that our maintenance and replacement strategies at the time were inadequate to deal with the ageing of our network and if not addressed could lead to an impending death spiral which we would not be able to recover from. Consequently, we adopted a holistic approach to address the issue including:

[1] Sourced from the Huegin 2012 Distribution Benchmarking Study

- A revision of Ausgrid's maintenance standards to ensure that objectives were consistent across the organisation. By the mid-2000s, maintenance completion was improving, as was the collection and accuracy of asset related data. This included a shift towards Asset Management best practice including Reliability Centred Maintenance (RCM) and Failure Mode Effect & Criticality Analysis (FMECA).

- Targeted replacement programs were developed for assets that were highest risk of not satisfying the regulatory obligations defined in the Introduction. These programs commenced in the later part of the 2004-09 period, despite insufficient regulatory allowance provided at the time.

Figure 1 - Business Lifecycle



In the 2010-14 period, Ausgrid proposed significant replacement of assets at all levels of the network in an effort to combat rising failure rates and the looming issue of a bow wave of replacements. As part of the proposal we presented analysis that showed the sustained increase in the age of our network assets, and how the proposed replacement programs would serve to reduce these increases.

At the time we recognised that the ageing of the asset base was an issue that could not be addressed in a single regulatory period. Due to the sheer size of our asset base, certain parts of the network would continue to increase in average age despite large scale replacement.

1.2 Outcomes from investment in the 2010-14 period

By the end of the period, a significant numbers of asset risks will have been removed from the network. In the sections below we provide a summary of the risky assets we have replaced, and the Duty of Care programs we have undertaken.

Replacement program

The key highlights of our replacement program include the removal of assets on the network that posed risks particularly to safety. The table describes the benefits from our targeted replacement program in the 2010-14 period.

Type of program	Description of outcomes
Transmission mains	As at the end of 2012/13 financial year we have completed 926 replacement jobs on transmission mains assets including the replacement of 711 poles. These jobs range from replacing small assets like individual insulators to replacement of kilometres of underground cable. The transmission mains replacement plan for the 2010-14 period consisted of 15 sub-programs. It is expected that all of these will continue into 2015-19 although some will be bundled into new programs of work. Notable programs include: • Replacement of 132kV 'fog' insulators and certain overhead conductor types due to age related condition issues. This sub-program will be carried out under the sub-transmission overhead feeder refurbishment sub-programs. • Refurbishment of steel towers and their associated earthing systems due to age related degradation. • Replacement of 33kV and 132kV fluid filled gables due to age related degradation, environmental risks due to fluid leakage, high maintenance requirements and reduced manufacturer support for this cable technology. Replacement has mostly been carried out under 'Area Plans'. Replacement of 33kV gas pressure cables due to age related degradation causing high levels of gas leakage. Replacement has mostly been carried out under 'Area Plans'.
Sub-transmission and zone substations	As at the end of 2012/13 financial year we have completed 370 replacement jobs in our existing sub-transmission substations, and 960 jobs in our zone substations. Notable programs were: • Significant replacement of 33kV bulk oil circuit breakers (CB). The older CBs posed unacceptable safety risks due to a history of catastrophic failures and fires driven by poor asset condition. • Replacement of 11kV bulk oil circuit breakers. There were a number of catastrophic switchboard and circuit breaker failures experienced in Ausgrid. Replacing the oil circuit breakers with vacuum type circuit breakers largely removed fire risks from the substations, allowing cost effective extension of the switchboard life.
Distribution Substations	As at the end of 2012/13 financial year we have completed 2929 individual replacement jobs in distribution substations. These range from replacing small assets like circuit breakers to full substation replacement. The distribution substation replacement plan for the 2010-14 period consisted of 37 sub-programs. It is expected that of these, 12 will either be completed or closed off. Notable programs at or near completion include: • Replace "Cubicle" switchgear distribution substations. These substations contained some of the oldest electrical equipment on the network. They were commissioned from 1914 up until the early 1950s. The "cubicle" high voltage switchgear had major safety and operating concerns and was the subject of operational restrictions. The removal of this switchgear has seen a significant network risk removed. • Ex St George County Council Outdoor Enclosure distribution substations. These obsolete outdoor style substations were commissioned between 1944 and 1973. There have been a number of significant incidents because the high voltage and low voltage switchgear is housed in a timber enclosure. A fire in 2000 starting in the substation caused significant damage to an adjoining private property. These assets carried a significant safety and liability risk.
Distribution mains	As of 30/06/2013 we have completed 95,916 replacement jobs and replacement of just under 200kms of distribution mains assets. These range from replacing small assets like

	low voltage pillars or overhead services to replacement of kilometres of underground cable or overhead mains. The distribution mains replacement plan for the 2010-14 period consisted of 28 sub-programs. It is expected that of these, 8 will be completed or closed off. Notable programs include: • Replacement of oil filled 11kV reclosers and sectionalisers due to oil-related fire risks, high maintenance requirements and their age. All assets of these types will have been replaced by the end of the 2010-14 period. • Replacement of LV underground CONSAC & HDPE cables due to known condition issues causing high levels of failure and electrical safety risks for both our staff and public. Replacement of these cables has been more difficult and costly than expected but more than 100km of these cable types will have been replaced by the end of the 2010-14 period. • Replacement of 11kV steel mains due to known condition and fire risk issues. The small steel conductors corrode and fail causing electrical safety risks to Ausgrid staff, farmers and livestock, as well as potentially igniting combustible materials in rural or remote areas. More than 130km of steel mains will have been replaced by the end of the 2010-14 period. • Replacement of condemned poles when they have failed our testing processes for structural integrity. More than 16,167 condemned poles will have been replaced by the end of the 2010-14 period. • Replacement of overhead service wires due to known age related insulation condition issues which pose electrical safety risks to both our staff and public. More than 78,800 overhead service wires will have been replaced by the end of the 2010-14 period. • Replacement of 11kV air break switches. Some types of air break switches are being proactively replaced due to known condition issues which pose electrical safety risks for both our staff and the public, others types are replaced reactively following failure. More than 2,300 air break switches will have been replaced by the end of the 2010-14 period.

Duty of Care

As at the end of 2012/13 financial year we have completed 485 individual Duty of Care projects. We made some headway into addressing concerns with assets that did not meet safety, environmental and compliance standards. For example:

- We expect to mitigate the majority of fire related risks at zone and sub-transmission substations with completion of the 11kV vacuum circuit breaker conversions to remove the risk associated with oil in substations and the installation of fire hydrant sub-programs.
- Upgraded the anti-climb devices at over 70 steel towers.
- Replaced deteriorated concrete pit lid, including concrete cement, at 66 outdoor Zone & STS switchyards
- Replaced 54 kiosks that contained exposed 11kV
- Completed the replacement of 1.57km of Façade Mounted ABC
- Address the non-complaint 33kV busbar ground clearances at 8 substations

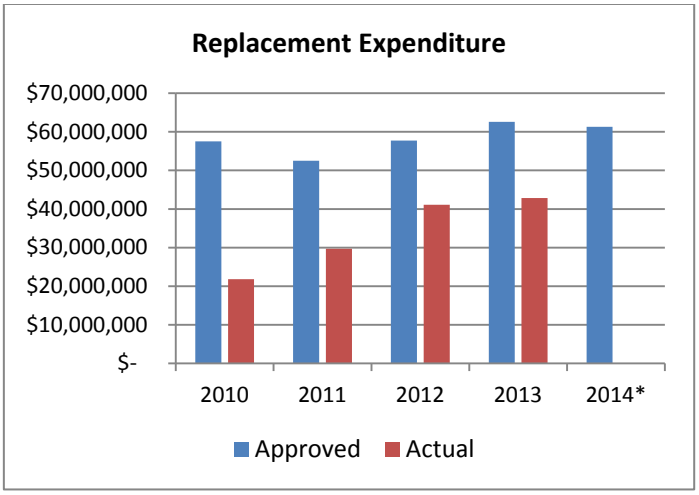
- Completed the risk assessment of all power line crossings of navigable waterways and implement the required controls to address the majority of the extreme risk rated crossings.

- We replaced asbestos roofs at a number of zone and distribution substation as well as the removal of asbestos from of the Sydney CBD pits.

- Improved fire safety at Ausgrid's zone & STS substation by installing Very Early Smoke Detection Alarms (VESDA) and upgrade the fire hydrants to comply with the relevant modern day standards.

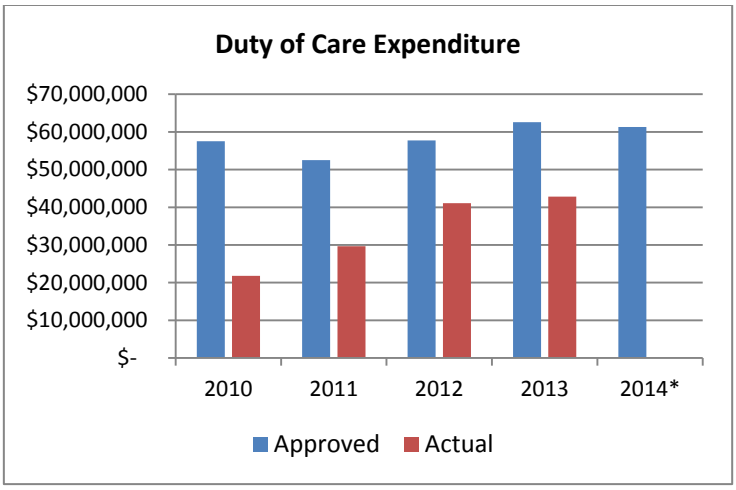
1.3 Variations to forecast

During the 2010-14 period Ausgrid has significantly underspent on our capex allowance for Replacement and Duty of Care plans. We expect to incur $1.04 billion on Replacement plans by the end of the 2010-14 period. This is $398 million or 32 percent below the total planned expenditure for the first three years of the period.



*No actual expenditure for 2014 has been included.

For the Duty of Care plans, we expect to spend $191 million by the end of the 2010-14 regulatory period, which is $95 million or 41 percent below the total planned expenditure for the period.



*No actual expenditure for 2014 has been included.

The key reason for variation involves re-prioritisation of the program in response to the following issues:

- More detailed information on our assets – At the time of our forecasts in 2007/08 for the 2010 - 2014 period, we did not have an integrated asset management system in place to provide more detailed information on the condition and failures of our assets. More detailed information lead to greater accuracy in risk profiling allowing for work to be re-prioritised with minimal impact on total risk.

- Review of risk thresholds in response to price pressures – The adverse impacts from large price increases made us consider whether there were opportunities to take on greater risks by deferring capex programs. We recognised that this would enable us to lower price pressures in the next period by reducing the size of the opening Regulated Asset Base (RAB) for the next period, consistent with the incentive regime for capex.

- Higher than forecast costs – Our unit cost estimating system for the 2010-14 proposal was at a high level, and did not accurately estimate the actual costs of delivering our program. Higher costs led to a re-examination of whether full replacement was cost effective to mitigate the risk. Some of these additional costs were driven by design complexity and additional civil work not originally understood at conception last period.

- Delivery issues – Ausgrid faced a significant challenge in delivering a large step change in replacement and capacity expenditure. In the initial years of the regulatory period, we had significant issues with resource constraints to deliver the entire program. There was an expectation that overflow work would be managed through an alliance with external contractors. This did not prove to be as effective as originally anticipated. Our workplan placed higher priority on compliance with our new licence conditions, and with replacing the major assets on our sub-transmission network as set out in our Area Plans. This was due to the fact that much of the work identified under the Area Plans also had Replacement and Duty of Care issues, allowing for multiple drivers to be removed. Additional delivery issues included delays as a result of coordination of outages through lack of network redundancy and delays in procurement processes.

In recognising the shortcomings in the previous forecast, Ausgrid has adopted the following measures for 2015-19 to ensure a greater level of accuracy:

- Significant consultation and alignment of the forecast replacement plans with the delivery capability of the organisation and the market taken into account when developing forward programs.

- The successful delivery of a number of major Area Plans projects has allowed for greater network redundancy for easier outage coordination.

- The majority of programs for the 2015-19 period are continuing from the 2010-14 period, where procurement contracts were already established. Lessons learnt from the procurement exercises undertaken over the last period have improved our processes for the next period.

- Detailed risk profiling by asset group undertaken in developing the Asset Condition & Planning Summaries and Replacement sub-programs, allowing for improved risk profiles, programs and delivery plans. This greater accuracy allowed for work to be shifted with minimal impact on total risk.

- Detailed review of the anticipated price impacts of the proposed replacement and DOC expenditure forecast including community engagement surveys and adjusted risk profile models and tolerances.

- A full review of unit costs including market driven assessments and benchmarking studies aimed at delivering improved cost structures and deliverability.

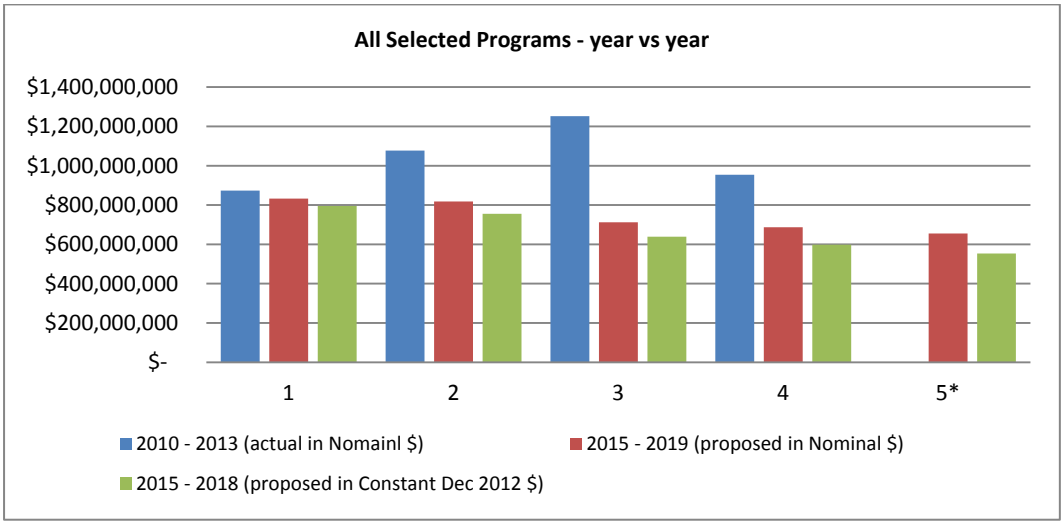
Previous expenditure is a relevant reference point to assess our forecast capex for the 2015-19 period. Our evidence shows that the proposed capex can be explained at a high level by our previous and future circumstances.

In the next period, we are delivering a far smaller capital program, which will not create the same delivery issues as last period. A new structure is being developed to overcome these issues and will allow for increased benchmarking, a more competitive blend of internal and external service providers and enhanced delivery capabilities.

In light of an ageing asset base and deferral of work last period, leading to increased deterioration and increased risk, regulatory obligations can only be met if a higher level of capex for Replacement and Duty of Care in the 2015-19 period is undertaken.

As stated, when combined with all other proposed plans, Ausgrid's total proposed capex is less than that actually spent last period. Figure 2 reflects the change in total capex for the first 4 years of last period (actual) against the proposed for next period. We would therefore expect delivery resources to shift focus from other the delivery drivers to delivery of Replacement and Duty of Care.

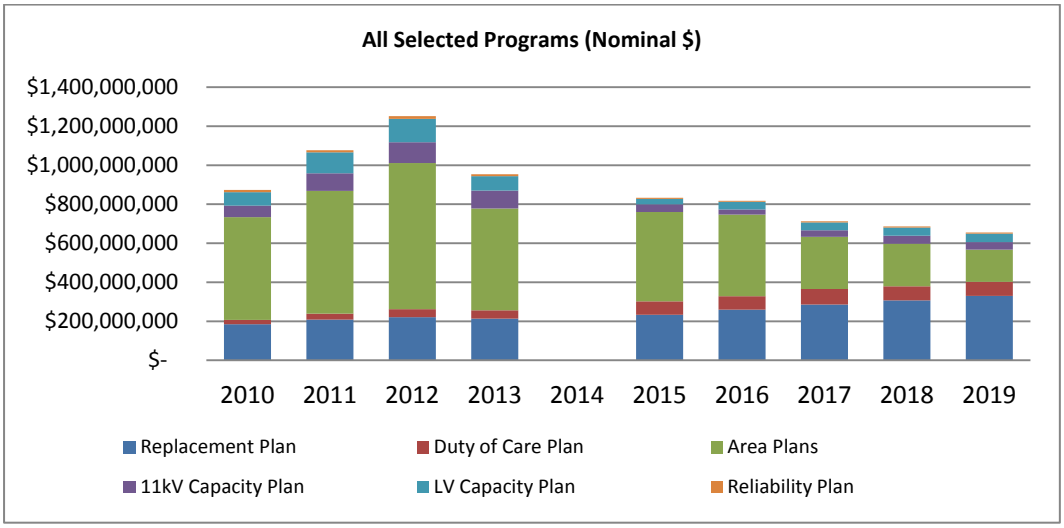
Figure 2 - Shift in total capex



*Year 5 has been excluded as the 2014 actual expenditure is still unknown.

The programs included are those where shared resources are required. Figure 3 shows the total capex split by plan.

Figure 3 - Total Capex



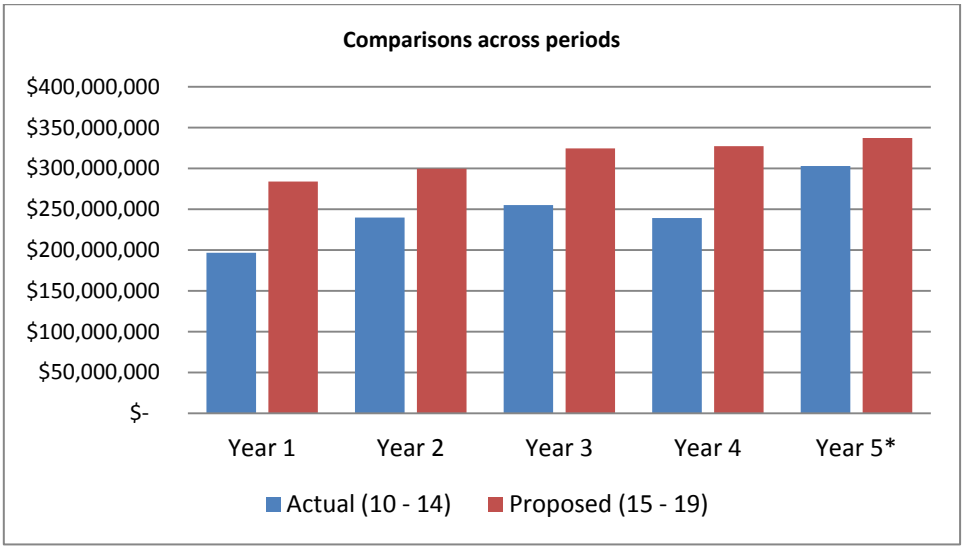
The 2010 - 2014 period was the first time Ausgrid attempted to undertake a program of this size and complexity. The learning from this period has been adopted into our delivery plans for next period.

Circumstances in 2015-19

As the average age of our distribution assets continue to rise, with 34 percent over their standard life, Ausgrid's Replacement program carefully targets assets which pose unacceptable risk in meeting our regulatory obligations of delivering a safe, reliable and sustainable network in an environmentally responsible manner. We have sought to minimise price pressures to our customers by making economically prudent investment decisions and by deferring replacement where the risk can be contained within acceptable thresholds.

The purpose of this section is to identify the key circumstances driving Ausgrid's capex in the 2015-19 period, particularly in relation to previous expenditure.

At a high level, Ausgrid's forecast capex is above actual expenditure during the 2010-14 regulatory period for both Replacement and Duty of Care plans. For the Replacement plans, proposed capex will be 20 percent higher than actual expenditure in the previous period ($1.25 billion), and for Duty of Care plans we are proposing 70 percent higher than the previous period ($324 million).



* Year 5 for the Actual (2010 - 14) period represents planned expenditure for 2014.

In the sections below we show the focus of our expenditure drivers and our proposed program of work has balanced the need to minimise prices while still addressing unacceptable risks on the network.

- Further deterioration in condition of aged assets – In response to delivery issues during the last period, we chose to target our Replacement program at critical sub-transmission assets within our Area Plans where replacement drivers were also present, and consequently deferred replacement of distribution assets. In doing so, we were able to gain maximum risk mitigation by addressing Replacement and Area Plans risks in a single project. However, the implication is that age deterioration of our distribution network rapidly increased during the 2010-14 period, leading to greater asset degradation and an increasing risk of not meeting our regulatory obligations.

- Duty of Care issues – Many of Ausgrid's assets still fail to meet compliance standards for a modern day DNSP. A number of issues still remain on the network including but not limited to asbestos, oil containment and low mains.

- Minimise price pressures - We have sought to defer expenditure by prioritising the program to the full extent possible, and by identifying potential efficiencies in scope and costs. We have also undertaken whole of life costing to ensure the most economically prudent investment solution is selected.

2.1 Condition of assets deteriorated over the 2010-14 period

In the last period Ausgrid had significant delivery and cost pressure issues that resulted in a re-prioritised program that focused on:

- Compliance with new design, reliability and performance standards, which we were required to achieve by the end of 2014.

- Major replacement works for the sub-transmission network, which we considered critical for addressing large scale risks.

A key consequence of these delivery and cost issues was that Ausgrid sought all opportunities to defer investment on replacing distribution assets. We also deferred a number of jobs we were going to undertake on smaller equipment within existing sub-transmission population. The decision about which assets/jobs could be deferred was aided by a more refined analysis of risk and failure history, which enabled us to manage the network within acceptable risk boundaries.

Our re-prioritisation recognised that deferral had short term benefits by reducing the opening Regulated Asset Base (RAB) for the next period (and thereby reducing price pressures for our customers). At the same time, we understood that long term deferral would not be possible, given the substantial number of assets beyond their technical life.

Our most recent analysis reveals that the health of the distribution network will decline rapidly in the 2015-19 period in the absence of an increase in capex from current expenditure levels. In turn, this would result in unacceptable risks for our staff and customers that could not be managed through alternative means.

In the sections below, we show that the age of our assets on the distribution network increased markedly over the 2010-14 period, and that failure rates, in the absence of replacement, will likely rise during the 2015-19 period.

Asset age profile

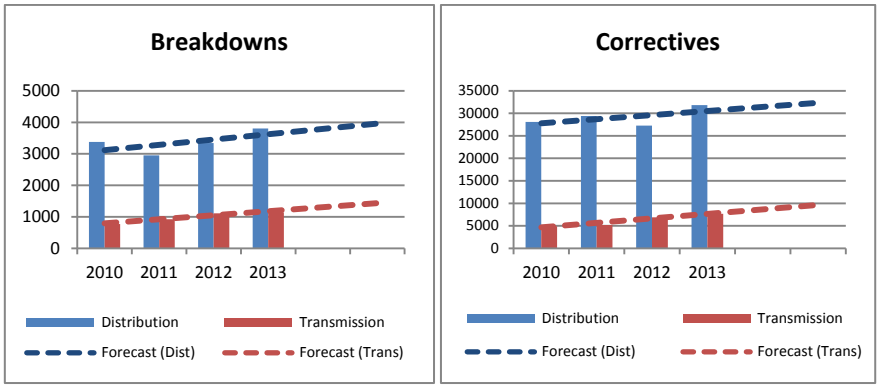
In the last period, our investments on major sub-transmission assets resulted in a decrease in average age across major asset types. However, as a result of deferring our planned jobs for smaller equipment on sub-transmission assets, there still remain assets which are heavily degraded and pose a significant risk that were not replaced. From the 2013 RIN approximately 21 percent of transmission assets are over their standard life.

In contrast, the average age of distribution assets has increased despite significant investments this period. From the 2013 RIN we estimate that 34 percent of our distribution assets exceed their standard asset life.

Forecast failure rates

As stated, increased asset deterioration leads to increased asset risk. In replacement this risk is reflected by an assets probability of failure and hence it's failure rate. While assets at all times in their life carry risk, generally these risks are mitigated through engineering, administrative and PPE controls. However, when an asset fails the risks posed can often be at an unacceptable level. Ausgrid attempts through its replacement strategy to mitigate these increased risks before they occur.

While age is not a standalone driver for replacement, asset age can affect asset deterioration and can therefore be linked to asset risk. It can be concluded that as assets continue to age and deteriorate, the probability of failures will increase and without intervention will result in increased failure rates.



The above figures show the trend and forecast over the 2010 - 15 period of breakdown and corrective failures for both distribution and transmission assets. The correctives show the number of issues identified during maintenance and addressed to prevent a breakdown. The breakdowns show the number of issues that went through to full failure.

The large number of correctives versus breakdowns highlights the success in our planned maintenance and condition monitoring to address issues before they become breakdowns. However, the upward trend in both breakdowns and correctives reflects the increase in asset deterioration and condition and suggests a need for additional investment.

2.2 Duty of Care issues

With many of Ausgrid's assets built between the 1960s and 1970s, a number of our network assets do not meet modern day safety, environmental and compliance standards. In response firstly to delivery issues and price pressure, Ausgrid re-prioritised our program for the 2010-14 period to focus on addressing assets that did not meet modern day safety standards, and sought to manage our risks for our environmental and compliance programs. A hierarchy of controls approach to risk mitigation has been adopted to optimise risk based decisions. In some cases, controls such as PPE and administrative controls have been adopted to deal risks such as asbestos in the short-term.

Ausgrid recognised that ongoing deferral of these risks was not optimal or sustainable. Not optimal because we weren't addressing all of the risks and not sustainable because although deferral was acceptable in the short term. Continued deferral of these risks is not an appropriate strategy for Ausgrid operating as a DNSP as ultimately such deferral is likely to lead to a breach in regulatory obligations. Our program of works for the 2010-14 period recognises that even in a price constrained environment, we still need to focus on compliance with modern day standards to avoid untenable risks.

2.3 Focus on efficiencies to minimise price pressures

A key focus of Ausgrid's proposal is to minimise price pressures faced by our customers in the 2015-19 period in response to the price shocks experienced in the 2010-14 period. As part of our capital reduction strategy, we have re-considered the following aspects of our planning approach:

Deferral of capex

Ausgrid has considered how we can reduce capex by deferring replacement of assets. Our methodology has looked at whether we can manage the risk through alternate means, or whether we could tolerate the risk without serious consequence to the community or our workers.

The resultant program of works is therefore highly focused on assets that pose unacceptable risks and defer capex to the full extent possible in the period.

Cost efficiencies

We have also focused heavily on identifying potential for cost reductions in delivering the program. There are three ways Ausgrid has sought to find cost efficiencies:

- We have examined whether the scope of works could be minimised to reduce costs.
- We have also examined whether there could be efficiencies in scope required to deliver the program.
- Finally, we have considered efficiencies that may occur at time of delivery. In particular we have revised our plans downward to our plans to account for the delivery synergy with the distribution capacity plans. Section 3.4 provides more detail on how this adjustment was carried out.

Our forecast process

For the 2015-19 proposal, we have refined our method to develop the optimal replacement and Duty of Care programs. Our approach allows us to identify emerging issues on our network and select the least cost solution to address the issue including replacement activity.

The purpose of this section is to provide an overview of the process used to derive our Replacement and Duty of Care capex for the 2015-19 period.

Ausgrid's method for developing the proposed Replacement and Duty of Care plans for the 2015-19 period draws on the principles in our asset management strategy. In Chapter 1, we noted that we incur capex where economically prudent.

For the 2015-19 proposal, we have refined our processes to develop a program of planned and reactive works. Ausgrid's refined methodology involves a more detailed consideration of options including the optimal mix of replacement / refurbishment and maintenance using Net Present Value (NPV) analysis to determine economic prudency. Learning from our experiences in the 2010-14 period, we have also deeply considered whether there are opportunities to defer replacement in the period by refining our assessment methodology. A Risk Quantification Model was used to determine if the proposed program was efficient.

In the section below we provide further information on our methodology including:

- Identifying the need - Explains how Ausgrid identifies a need for an asset management response to a condition issue or new legislative requirement.
- Prioritisation of the program - Explains our process for assessing options to address the issue including maintenance, managing the risk of asset failure (which would trigger reactive replacement), or planned (proactive) replacement / refurbishment or Duty of Care works.
- Cost methodology - Identifies our cost methodology for deriving the total expenditure for our proposed planned and reactive programs.
- Impact with other capital plans - Calculates synergies with capacity plans to take into account potential overlap with our proposed plans at time of delivery and during the planning phase.

3.1 Initial identification of need

Consistent with our existing method, we used a holistic approach to identify the most efficient solution to address emerging issues with assets in the 2015-19 period. Our approach was directed at understanding the changes we need to make to our current practices to address emerging condition or compliance risk.

Our options analysis sought to find the most efficient solution to address the risk. This was generally a combination of changes to existing maintenance practices, planned replacement / refurbishment activity, or allowing for reactive replacement when assets fail in service.

In the section below we describe how we identify emerging issues on the network, identify triggers for further investigation, and how we undertake a risk matrix exercise to establish the severity of the situation.

Identifying emerging issues on the network

In developing the forecast for Replacement and Duty of Care plans for the 2015-19 period, we have analysed the most recent information on the condition of our assets and changes to our underlying compliance obligations.

Ausgrid has sophisticated data and systems to monitor the condition of assets on our network. We collect data from the field, examine test results and review recorded information. At a granular level, we track failure modes, asset condition, asset related costs and defects. At a high level, we also monitor age and replacement profiles. Our sophisticated asset management systems allow us to view the data from a number of perspectives including by asset type, asset group, region and manufacturer.

As a prudent asset management organisation, Ausgrid constantly monitor changes in legislation or obligations. This includes incorporating the findings of coronial inquests in other jurisdictions which provide guidance on acceptable standards for a modern day DNSP. Changes in our obligations may require us to undertake mandated actions to meet compliance, or may require a consideration of whether we are at risk of meeting a general (unspecified) standard.

Analysis triggers

For the 2015-19 period, we have used our existing method for identifying triggers for formal investigations of particular asset types where an emerging issue has been identified.

While we constantly monitor all the asset types on our network, it is unrealistic and inefficient to undertake detailed reviews of all our assets on a continual basis. Instead we undertake targeted investigations of specific technologies where identified by planned and reactive maintenance. The outcome of the investigation may lead to changes to maintenance or operation practices, modification of assets, or where economically prudent, development of a replacement program.

There are many events that may trigger investigations including information received at the time of maintenance reviews, failures of assets, changes to cost structures and new obligations. The trigger events are depicted in the diagram below.

Once a trigger has been identified, Ausgrid asset managers perform a detailed investigation of the asset type/technology including:

- Technical details from the enterprise asset systems and equipment manuals.

- Population information from the enterprise asset systems.
- Age information from the enterprise asset systems.
- Condition information from test reports and maintenance reports.
- Failure information from failure reports, the enterprise asset systems, regional and engineering staff.
- Industry knowledge and liaison including other DNSPs and suppliers.

The initial investigations we conducted in developing our 2015-19 plans provided us with a view on whether we are at risk of not meeting our obligations if we continue our current approach. For example, our investigations may have shown that an asset is experiencing an increasing failure rate, or evidence may show that the consequence of a failure led to a 'near miss' with a customer or worker's safety.

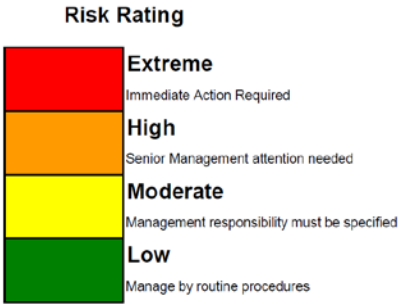
Risk Assessment matrix

Consistent with Ausgrid's existing processes, we applied a formal asset risk assessment to objectively determine the level of risk on assets with our current practices.[2] In turn, this helped us to provide an initial assessment on whether the severity of the situation may require planned replacement.

We applied our existing risk matrix to assist with this step of the investigation. We examined the probability of an event occurring (such as the failure of an asset) and paired this with the consequence of this event across a number of areas. The consequences we considered related back to our regulatory obligations. The following 5 factors were considered in the analysis; safety, environmental, reliability, liability and adverse publicity. We have clear guidelines on how to score probability and consequence so that our investigations are consistent and objective. Our risk matrix is provided below.

Likelihood		Consequences				
		1	2	3	4	5
		Insignificant	Minor	Moderate	Major	Catastrophic
A	Almost Certain	A1	A2	A3	A4	A5
B	Likely	B1	B2	B3	B4	B5
C	Possible	C1	C2	C3	C4	C5
D	Unlikely	D1	D2	D3	D4	D5
E	Rare	E1	E2	E3	E4	E5

For example, a score of C1, has a recommendation of 'Manage by routine procedure,' whereas a score of B3 has a recommendation of 'senior management attention needed'.



3.2 Options analysis and prioritisation of program

[2] This is the same approach we use to design our maintenance requirements analysis manual (MRAM) to develop a cost effective maintenance program

After performing the initial investigation and risk assessment, the next step was to identify potential options to mitigate against the risk/s posed by the current asset, if the risk assessment deemed action was necessary. This is an area where Ausgrid has refined its existing process for the 2015-19 proposal. We now use additional tools to guide our analysis such as Net Present Value (NPV) analysis to guide the optimal development of replacement programs.

Options Analysis

In some cases, capex is the only option to address an emerging issue. This is generally in response to a mandated action Ausgrid is required to perform under a compliance obligation. An example of this is the development of the Waterway Crossing program – the NSW Maritime legislation was changed and it contained significant new requirements and strict time frames.

Generally, however, decisions to incur capex are not as clear cut, and require prudent analysis and judgement. In developing our expenditure proposals for 2015-19 we undertook options analysis to determine the least cost option to solve an identified need. This includes looking at the optimal mix of capex (Replacement or Duty of Care) and system opex to manage our network assets over the period.

NPV analysis is undertaken in order to find this least cost option. This allows options with different time spans to be compared directly and is carried out in an Excel spreadsheet that has been specifically tailored to suit single asset options (i.e. replacement of a single circuit breaker or distribution substation) that may have different routine maintenance requirements. The outcome of this analysis is a preferred option which may involve a combination of maintenance, refurbishment, planned replacement or expected reactive replacement.

When undertaking our options analysis we seek to quantify the risk and the costs of potential solutions. We assess the risk posed by the assets, compared with the costs required to undertake the program. The Risk Quantification Model allows us to identify the optimal timing for replacement programs. Ausgrid performed the following tasks:

- Assessed the cost of undertaking a program in a particular time frame (for example, replace five units a year for five years).
- Calculated the risk cost of that particular program timing based on the risks of removing the assets at that particular speed.
- Compare the program cost with the risk cost. If the risk cost to be mitigated exceeded the program cost, then the program was considered positive and was accepted.

Prioritising the program

When prioritising individual assets, a set of risk criteria was developed. This inturn determined the priority for investment.

Priority at a high level was performed by comparing the relative risks of each program. High risk programs were given greater priority over lower risk programs.

3.3 Cost methodology

Our options assessment draws on accurate data on the costs of different solutions. This in turn provides us with a level of confidence on the forecast costs of completing our planned and reactive works.

For the 2015-19 proposal, we have used a number of sources to identify the costs of planned and reactive replacement:

- Estimating systems: We use a system called ATAD to estimate the costs of completing projects at Ausgrid. The system uses labour rates, allocations, material costs and contracted services rates.

- Site specific costs: There is the ability to vary for individual site or regional differences, such as travel time or known site conditions.

- Historical project information: If available, cost information regarding previous projects of a similar nature is useful when costing options. This is drawn from Ausgrid's integrated asset management system (SAP). It may prove useful as there may be costs that are not apparent when initially estimating that should be taken into consideration. It should be noted that, depending on the project, this information may not always be available. However, as a result of the works completed in the 2010 - 2014 period, more information is readily available.

More information on the exact cost method we have used to determine different elements is contained in the Unit Rate Justification document in the key inputs folder for Replacement and Duty of Care plans.

3.4 Impacts and synergies with other capital plans

We have taken great care in ensuring that we have accounted for synergies with other capital plans, and considered the reliability performance impact.

Synergies

Our forecast process has considered whether our planning estimates are the most likely estimate of the total costs we incur at the time of delivery. In doing so, we have considered how our plans inter-relate with other parts of the proposed capital program.

We have adjusted our Replacement and Duty of Care plan estimates to account for synergies that may occur at the time of delivery. This includes:

- Synergies within the Replacement and Duty of Care Plans - For example, a distribution substation may contain high voltage switchgear and low voltage switchgear, both of which have been identified as requiring replacement in a similar time frame. At the time of delivery, we may find a location where both assets require replacement and undertake a single project to resolve the issue. Where time frames are not exactly the same, projects are aligned so long as the residual risk in doing so can be tolerated for the period of delay. Alternatively projects may be brought forward to align and any increased costs in doing so would have to be overcome in cost savings therefore delivered through planning efficiencies.

- Synergies with the Low Voltage Plan[3] - At the time of delivery there are sometimes cases where the need to install new equipment on the Low Voltage network coincides with the need to replace an asset, leading to a synergy. For example we may need to install a higher capacity distribution transformer.

Depending on the nature of the project, carrying out a single project to address two issues may result in more efficient delivery model, reduced setup costs and reduced project management costs.

Ausgrid notes that the nature of our planning means that there are no synergies, in delivery, with other capital plans not explicitly identified and rationalised. In particular, we note there is a clear demarcation between the assets addressed in our Area Plans and in our Replacement and Duty of Care Plans and that no overlap exists. Any overlaps in these programs are recognised at the planning stage and accounted for in only a single plan.

Reliability impacts

Ausgrid programs are heavily targeted at removing high risk assets rather than addressing reliability issues. We aim to do this systematically before our customers experience any decrease in reliability from greater rates of failure.

[3] It should be noted that due to the nature of the customer connection plan, which typically involves the installation of new assets to deal with connecting/upgrading customers, there is little overlap between this plan and the replacement and duty of care plans. Similarly, there is little overlap between the 11kV plan and the replacement and duty of care plans. This is due to the minor nature of 11kV underground cable replacement that is forecast for the 2015-19 period.

Accordingly, the expected impact on reliability of the program is forecast to be negligible, as the aim of the program is to maintain our current levels of reliability. Most reliability incidents in the Ausgrid network are caused by nature induced factors such as fallen tree branches.

The most significant impact will be in the area of low voltage cable interruptions, through the removal of CONSAC and HDPE type cables. These cables pose significant safety risks to both staff and the public, but also experience a high number of failures. However, the overall network impact of a low voltage distributor failure is low due to the small number of customers that are generally supplied from each cable.

Summary of program

Our 2015-19 program of works is targeted at replacing degraded assets on our distribution network. The program is heavily focused on replacing high risk assets. We have a small program of works related to Duty of Care, with a heavy focus on addressing safety issues for our workers and the public.

The purpose of this section is to provide a summary of our plans, including our investment profile and key programs of work. Section 4.1 provides a breakdown of the program at a high level, with sections 4.2 and 4.3 providing a summary of the key projects in our Replacement and Duty of Care programs. Appendix C provides more detail by asset class and program.

In addition to the material provided, further justification and detail on each of our programs is contained in our Asset Condition and Planning Summaries (ACAPS) documents which identify the need, timing, options and costs related to each asset type. The format of our ACAPS document can be found in ACAPS methodology document. and the 'Justifications' in the Replacement folder under section 4.4 of the Regulatory Proposal DVD.

4.1 Investment profile

Our proposed capex for Replacement and Duty of Care plans is $1.57 billion. The table below provides the profile of expenditure for our major asset types in the Replacement plans and by driver for Duty of Care plans.

	2014-15 ('000)	2015-16 ('000)	2016-17 ('000)	2017-18 ('000)	2018-19 ('000)	Total ('000)
Replacement Plans	**218,665**	**235,846**	**252,991**	**264,315**	**276,579**	**1,248,396**
Transmission Mains	21,001	25,385	26,504	25,336	26,261	**124,487**
Sub-transmission Subs	16,770	21,244	27,906	24,003	23,469	**113,393**
Zone Substations	29,592	27,038	33,168	37,468	35,003	**162,268**
Distribution Substations	40,668	44,503	47,920	53,215	53,229	**239,534**
Distribution Mains	110,634	117,677	117,493	124,292	138,617	**608,714**
Duty of Care Plans	**65,398**	**63,867**	**71,548**	**63,001**	**60,676**	**324,489**
Safety	50,436	49,807	53,635	48,929	46,970	**249,777**
Environmental	11,666	10,170	12,835	8,685	8,319	**51,675**
Infrastructure Risk	3,296	3,890	5,078	5,387	5,387	**23,038**
Total	**284,063**	**299,714**	**324,539**	**327,315**	**337,255**	**1,572,885**

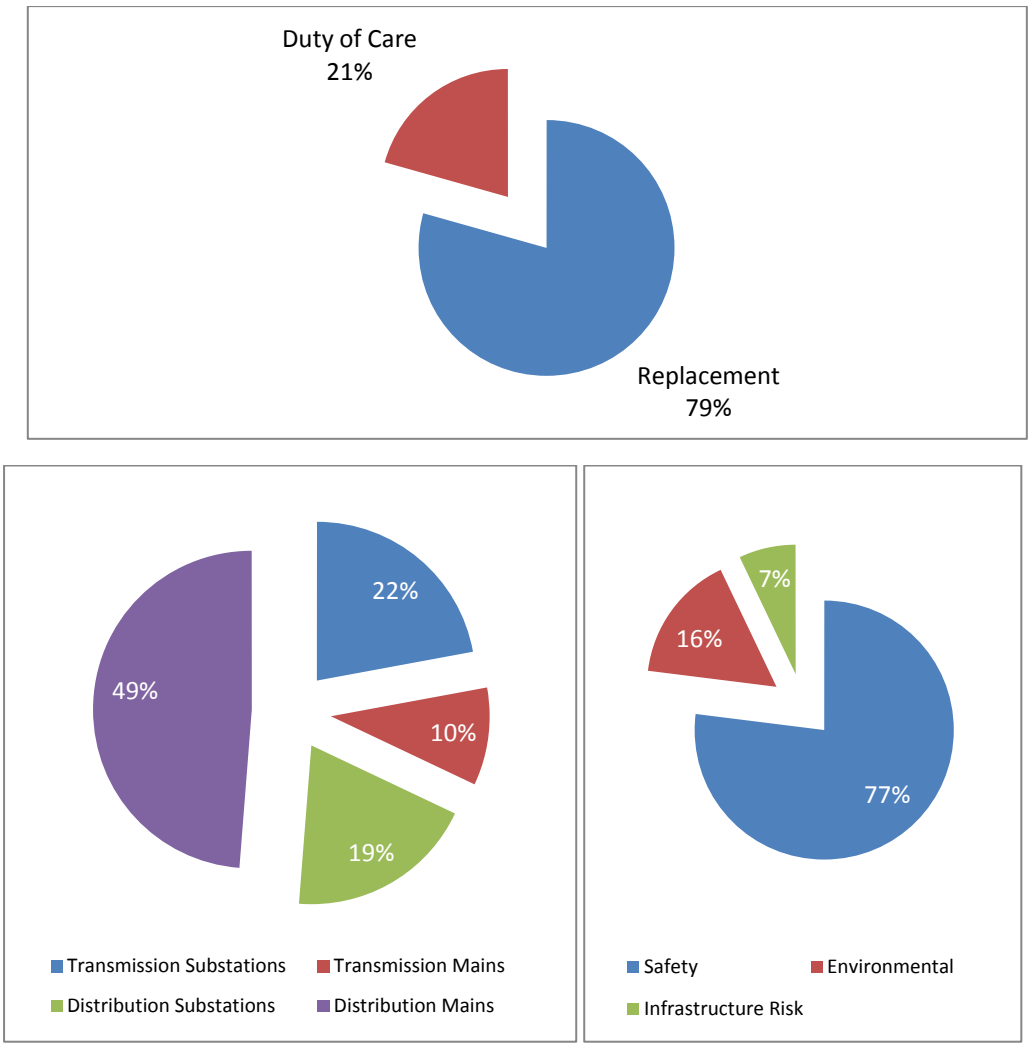
Split by asset class and plan

As can be seen in Figure 2, our Replacement plans account for the majority of the proposed investment (approximately 79 percent of our $1.57 billion proposal). This reflects that the majority of investment is to address deterioration issues on the network. The remainder of the program (21 percent) relates to Duty of Care capex. The diagram also highlights our key focus for the 2015 - 2019 period within our respective plans:

- Programs for Distribution Mains account for almost half of the replacement plans, while distribution substation programs account for 19 percent of the overall replacement forecast. Transmission works only account for approximately 32 percent of the program.

- Safety programs account for 77 percent of the proposed capex within the Duty of Care capex, with environmental obligations accounting for 16 percent and infrastructure security accounting for seven percent.

Figure 4 - Split by asset class and plan

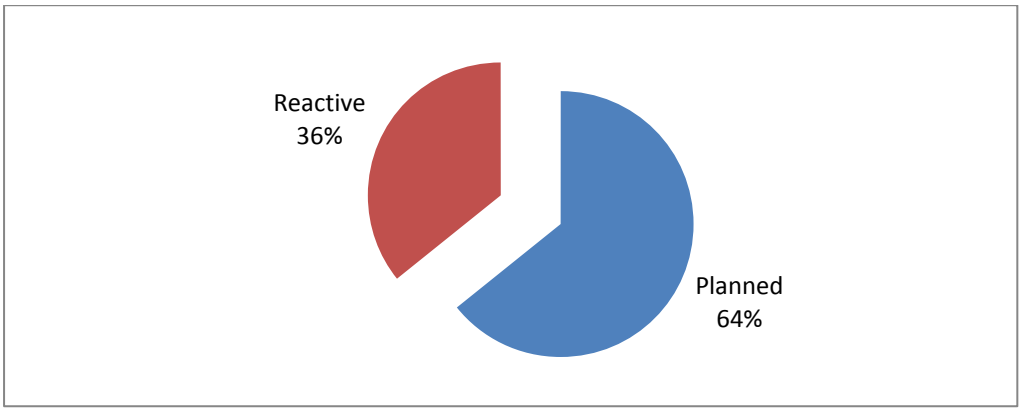


Split by reactive and planned replacement

A key consideration in our asset management strategy is whether there are alternative options to planned replacement, such as maintenance or reactive replacement or repair. Ausgrid generally only undertakes planned replacement when the risk (technical and financial) of keeping the population of assets in service is too high. In these cases, we consider the optimal timing and a mix of reactive/planned replacement.

The diagram below shows that 36 per cent of Ausgrid's proposed capex is for reactive replacement, while 64 per cent is for planned replacements.

Figure 5 - Split by reactive and planned



4.2 Key programs in our replacement plans

Ausgrid has substantial populations of distribution assets including more than 420,168 poles, 46,484 pillars and 9,553 pits associated with 36,640 kilometres of distribution mans, excluding street lighting mains, and over 30,000 distribution substations. For this reason, our focus is on ensuring that we continue to manage the risks of these assets at a portfolio level.

In particular, we have looked at managing known risks for particular technology types within the population where our analysis shows there are high safety risks. This includes:

- Steel round pillar replacement
- Pole and service wire replacement
- CONSAC and HDPE underground cable
- We are also replacing high risk distribution substations and switchgear. There are many types of substations on the Ausgrid network which pose significant safety hazards to staff operating and working around this equipment. The replacement of substations that reside on condemned poles is also included in this category.

In terms of our program for smaller existing Transmission assets including Transmission mains, Zone and Sub-transmission substations, our program is focused on:

- Protection relays
- Non-motorised I & E switches
- 11kV circuit breakers
- Pole replacement
- Refurbishment of overhead feeders
- Replacement of gas and oil filled underground cable

4.3 Key programs in our Duty of Care plans

Key programs to address our Duty of Care plans are:

- Replacement of non-compliant low mains

- Replacement of noisy transformers
- Replacement of asbestos fire doors
- Oil containment in Zone & Sub-transmission substations
- Optical Arc Flash Protection
- RTA blackspot poles
- Kiosk substations with exposed 11kV

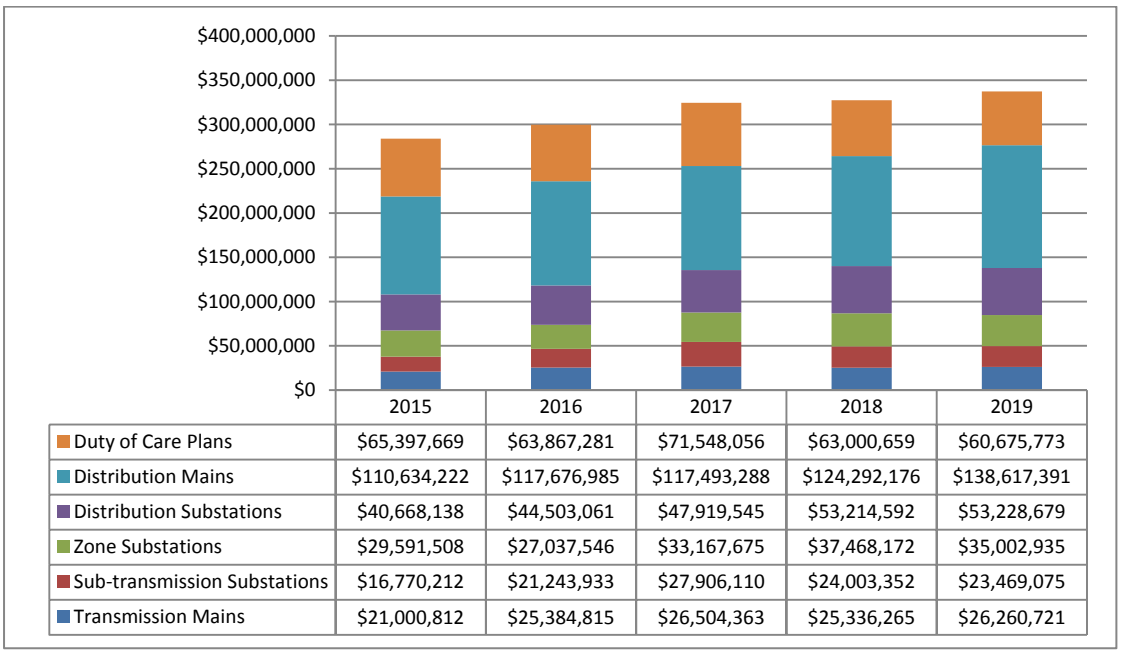
For details on each of these programs, refer to the respective ACAPS documents.

Summary by major category

The purpose of this appendix is to provide an overview of the funding requirements for the six asset groups comprising the Replacement and Duty of Care plans. Ausgrid grouped the assets in six main areas to assist in managing a large and diverse range of assets. The asset groups are divided into the following:

- Transmission mains
- Sub-transmission substations
- Zone substations
- Distribution substations
- Distribution mains
- Duty of Care programs

Figure 6 - Split by major asset category



	2015	2016	2017	2018	2019
Duty of Care Plans	$65,397,669	$63,867,281	$71,548,056	$63,000,659	$60,675,773
Distribution Mains	$110,634,222	$117,676,985	$117,493,288	$124,292,176	$138,617,391
Distribution Substations	$40,668,138	$44,503,061	$47,919,545	$53,214,592	$53,228,679
Zone Substations	$29,591,508	$27,037,546	$33,167,675	$37,468,172	$35,002,935
Sub-transmission Substations	$16,770,212	$21,243,933	$27,906,110	$24,003,352	$23,469,075
Transmission Mains	$21,000,812	$25,384,815	$26,504,363	$25,336,265	$26,260,721

Environmental Management System Manual

EM 002

Version 1.0

29 Oct 2013

Document control

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Release date	31 Oct 2013
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Functional application	Document Ausgrid's EMS
Organisational application	Ausgrid's environmental management procedures in accordance with ISO 14001.

Document history

Version	Summary of changes	Author
1.0	Initial version (combines former EM 01 EMS, EG 060 Liability, EL 001 Dissemination of Environmental Legislation, EL 002 Legislation summary, EL 003 Legislation updates, EM 005 Environmental Management Review, ENI 001 Environmental Risk Assessment, ET 000 Environmental Training system, ENA 004 ESU Environmental Audit procedure)	Vanessa Johnson

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Glossary

Term	Meaning
AEBN	Australian Environment Business Network
ASP	accredited service provider
AS/NZS ISO	Australian, New Zealand and International Standards
Balin	Ausgrid's Engineering Information Index
Connect	Ausgrid's environmental communications
EDO	Environmental Defender's Office
EIA	environmental impact assessment
EMF	electric and magnetic fields
EMS	environmental management system
EMShare	Ausgrid's environmental records system on SharePoint (a Microsoft application)
ENA	Energy Networks Association: the national body representing gas distribution and electricity transmission and distribution businesses throughout Australia.
Env GIS	Ausgrid's environmental geographic information system
Environmental Index	Ausgrid's portal for environmental management information such as guidelines.
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPA	Environmental Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Act 1999*
ESC	Ausgrid's executive level Environmental Steering Committee
ESIP	Ausgrid's environmental sustainability improvement program
ESU	Environmental Services section (formerly a Unit)
EWON	The Energy & Water Ombudsman NSW
HAC sheet	Hazard Assessment Checksheet
KPI	Key Performance Indicators
NELA	National Environmental Law Association
OEH	Office of Environment and Heritage
PCB	polychlorinated biphenyls
PDS	Performance Development System
PIRMP	Pollution Incident Response Management Plans
POEO Act	NSW *Protection of the Environment Operations Act 1997*
QAR	quality action request
SAP	Ausgrid's information management system (includes financial, procurement, project, scheduling, asset management, customer and workers data).
TAFE	Technical and Further Education: Australia's largest training provider
TIBCO	A central database for storing EIA Worksheets
TRIM	Ausgrid's corporate Electronic Document and Records Management System
WIN	environmental work improvement notice
The Wire	Ausgrid's intranet
WRAPP	waste recycling and purchasing policy

1 About this document

This manual provides a framework and mechanism to implement, maintain and continually improve Ausgrid's Environmental Management System (EMS). Ausgrid's EMS helps all of us manage and improve Ausgrid's environmental performance. An EMS is an organised, formal and proactive approach to managing environmental issues within a company.

1.1 Scope

EMS overview

ISO 14001 (4.1): *define and document the scope of a company's EMS.*

Ausgrid's EMS, documented in this manual, applies to all activities, products and services carried out by Ausgrid which may impact on the environment, including those carried out by contractors and accredited service providers (ASPs).

Ausgrid is working towards one EMS certified to the Australian and International Standard AS/NZS ISO 14001:2004. Ausgrid has demonstrated conformity with ISO 14001:2004 by seeking certification of its EMS by an external company since 1996.

1.1.1 Audience

This manual is intended for all Ausgrid workers and is available to Ausgrid staff. It also provides requirements for Ausgrid staff who manage external workers - specific procedures that apply to contractors and ASPs are made publicly available.

1.2 About Ausgrid

Ausgrid is a State-owned corporation whose shareholder is the NSW Government. We have been operating an electricity network for more than 100 years.

On 1 March 2011, our retail business and brand was sold to TRUenergy, however we continue to provide services to TRUenergy under a Transitional Services Agreement until early 2014.

In July 2012, the Networks NSW operating model was formed, with a common board and CEO, to provide a streamlined governance and management structure for the three 'poles and wires' businesses (Ausgrid, Essential Energy and Endeavour Energy).

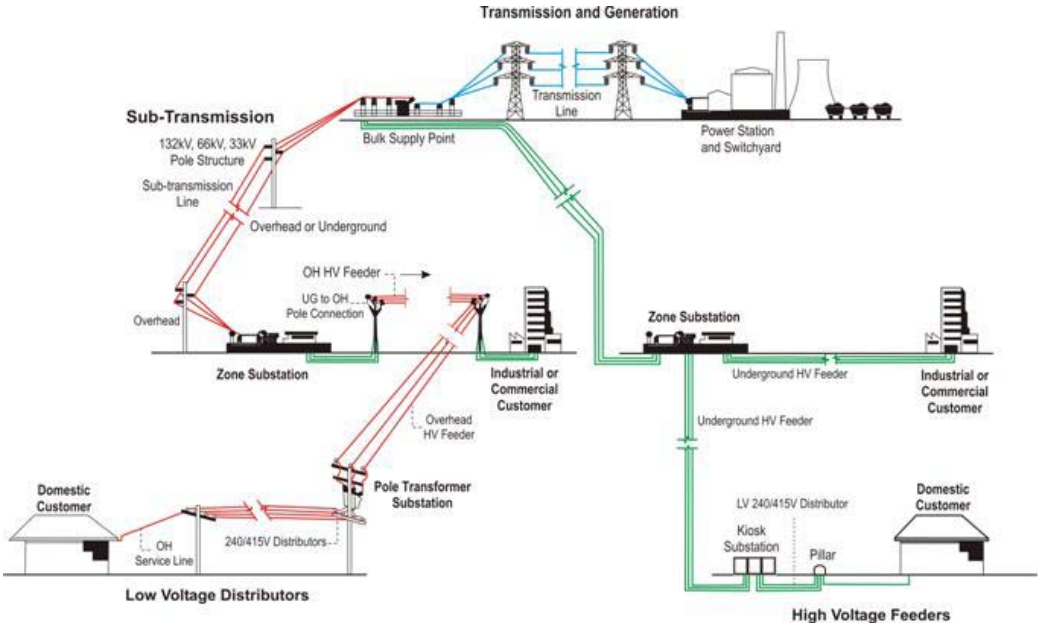
Ausgrid operates a network across 22,275 square kilometres, distributing electricity to 1.6 million customers in both rural and urban areas across the Sydney, Central Coast and Hunter regions (Figure 1-1). The network is made up of more than 200 large substations, 500,000 power poles, 30,000 distribution substations and almost 50,000 kilometres of below and above ground electricity cables (Figure 1-2).

Our main activities include:

- asset ownership and management of an electricity distribution network
- infrastructure-related construction, maintenance and property management
- emergency restoration and repairs
- a range of other services, including customer connections, street lighting, safety check-ups, energy reviews, metering, 24-hour electrical repairs and other support.

Figure 1-1: Ausgrid's network area

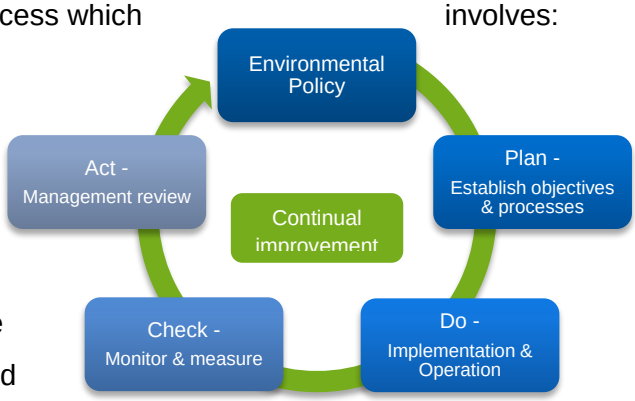
Figure 1-2: Electricity supply chain



A number of changes are currently occurring as Ausgrid undergoes a restructure and awaits direction from Networks NSW, including the long term scope of our EMS certification. Regardless, Ausgrid is committed to conducting business to prevent environmental harm and ensure sustainable development.

2 Introduction

Our EMS is a continual improvement process which involves:



- setting our environmental **policy**
- conducting **planning** to ensure success of the policy
- **implementing** practices, programs, and procedures
- **monitoring** and measuring to evaluate environmental performance
- **checking** for and correcting identified problems
- periodically **reviewing** the entire system at a top management level.

Ausgrid's EMS is essentially the way we manage our environmental performance. It consists of a combination of procedures, processes and documents aimed at achieving our environmental goals through both consistent and effective control of our operations.

The EMS defines the company's structure, responsibilities, practices, procedures, processes and resources for environmental management.

Ausgrid first commits to an environmental policy, then uses its policy as a basis for establishing a plan, which sets objectives and targets for improving environmental performance. The next step is implementation. After that, we evaluate our environmental performance to see whether the objectives and targets are being met. If targets are not being met, corrective action is taken.

The results of this evaluation are then reviewed by top management to see if the EMS is working. Management revisits the environmental policy and endorses new targets in a revised plan. We then implement the revised plan. The cycle repeats, and continuous improvement occurs.

In summary, the EMS follows the repeating cycle of plan, do, check and act.

2.1 Benefits of an EMS

Ausgrid's environmental system has a number of benefits, including:

- improves environmental performance
- improves legal compliance
- demonstrates due diligence
- reduces liability exposure
- prevents pollution
- reduces other harm to the environment
- reduces accidents in the workplace
- reduces costs, including insurances
- increases efficiency and conserves resources
- improves employee engagement
- improves regulator relationships
- enhances public credibility / relations
- offers competitive advantage
- demonstrates continual improvement
- establishes a holistic, integrated and risk based approach to managing our environmental program

2.2 EMS requirements

The key requirements of ISO 14001:2004 include:

Develop an EMS

1. **Scope** - define and document the scope of the company's EMS.
2. **Policy** - formulate an environmental policy relevant to the scale and nature of the company's activities.

Plan

3. **Impacts & aspects** - identify the environmental impacts of a company's activities.
4. **Legal requirements** - identify and update legal and other requirements relevant to the environmental aspects of the company's activities.
5. **Objectives & targets** - establish and review environmental objectives and targets.
6. **Performance indicators** - develop and use performance indicators.

Do

7. **Roles** - define, document and communicate roles, responsibilities and authorities.
8. **Program** - establish an environmental management program to achieve those objectives and targets.
9. **Training** - identify training needs and provide appropriate training.
10. **Communications** - establish procedures for internal and external communications relating to environmental aspects of the company.
11. **Operational control** - identify and plan operations that are associated with the significant environmental aspects
12. **Documentation** - document the system, either in paper or electronic form.
13. **Document control** - establish document control procedures for routine operations.
14. **Emergencies** - define and maintain procedures for responding to accidents and emergency situations and review and revise these procedures after an occurrence.

Check

15. **Monitoring** - monitor practices which can impact on the environment.
16. **Evaluation of compliance** - develop procedures for handling identified non-compliance and for initiating and implementing corrective action.
17. **Corrective action** - deal with actual and potential nonconformities by taking corrective action and preventive action.
18. **Record keeping** - establish systematic record keeping.
19. **EMS audits** - implement a program and procedures for periodic EMS audits.

Act

20. **Management review** - review the system and its suitability and effectiveness in achieving its objectives.
21. **Continual improvement** - identify areas for improvement.

This manual outlines the process for meeting these requirements. The application of Ausgrid's EMS in relation to managing our significant aspects is depicted in Figure 2-2.

Figure 2-1: EMS overview - Interaction of Ausgrid's EMS elements (click the arrow)

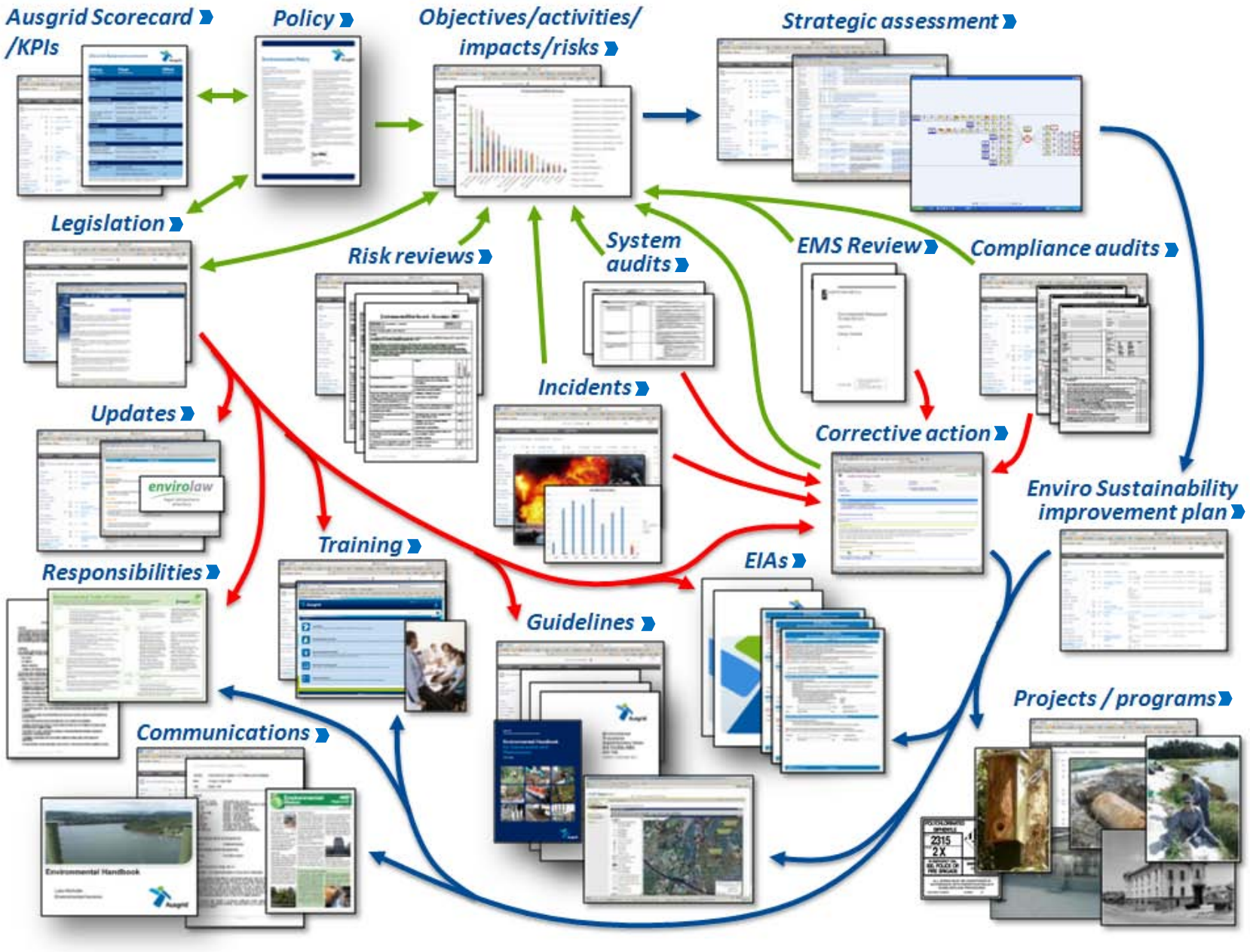


Figure 2-2: Implementation of Ausgrid's EMS (click the arrow)

3 Environmental policy

EMS overview

ISO 14001 (4.2): *formulate an environmental policy that is relevant to the scale and nature of the company's activities and is communicated to all employees as well as being made available to the public.*

Ausgrid has an environmental policy which sets the standard for environmental performance across the company and it provides the benchmark against which all subsequent actions are judged.

Ausgrid is committed to complying with our environmental policy, which:

- covers the nature, scale and environmental impacts of our activities, products and services
- includes a commitment to continual improvement and prevention of pollution
- includes a commitment to comply with applicable legal and other requirements to and minimise the environmental impact of our past, present and future activities to avoid offences and penalties for the company
- provides the framework for setting and reviewing environmental objectives and targets
- is documented, implemented, maintained and reviewed at least annually
- considers our vision, core values and beliefs
- coordinates with other company policies (eg health and safety, investments)
- is communicated to all workers via our company induction process
- is available to the public and external workers on Ausgrid's website, under Corporate reports - Ausgrid.

Further information about environmental management is available on The Wire.

Refer to section 4.5 for information about our legal requirements and the application of defences, primarily due diligence.

4 Planning

EMS overview

The environmental planning process involves identifying what needs to be done to most effectively comply with our policy. Ausgrid uses a risk assessment approach to systematically and consistently assess the company's environmental risk exposure.

At a company level, we adopt the business risk assessment process. At a branch level, we undertake environmental risk reviews. At a project level, we undertake environmental impact assessments (EIA).

The environmental risk assessment is evolving to be a robust, transparent and defensible which is now incorporating a broader organisational involvement. This will translate into improved due diligence for Ausgrid.

4.1 Impacts and aspects

ISO 14001 (4.3.1): *identify the environmental aspects of the company's activities.*

4.1.1 Aspects

An environmental aspect is an element of a company's activities, products or services that can interact with the environment and a significant aspect has or can have a significant environmental impact.

Ausgrid's procedure for identifying and assessing its aspects is outlined in section 4.3. Our aspects are generally defined by business services (branches) within the company that can materially interact with the environment (see Figure 4-1). Ausgrid's EMShare Aspects and impacts register is updated regularly. The control and influence over our aspects varies greatly between suppliers, operations, new construction work, contractors, ASPs and consumers of electricity.

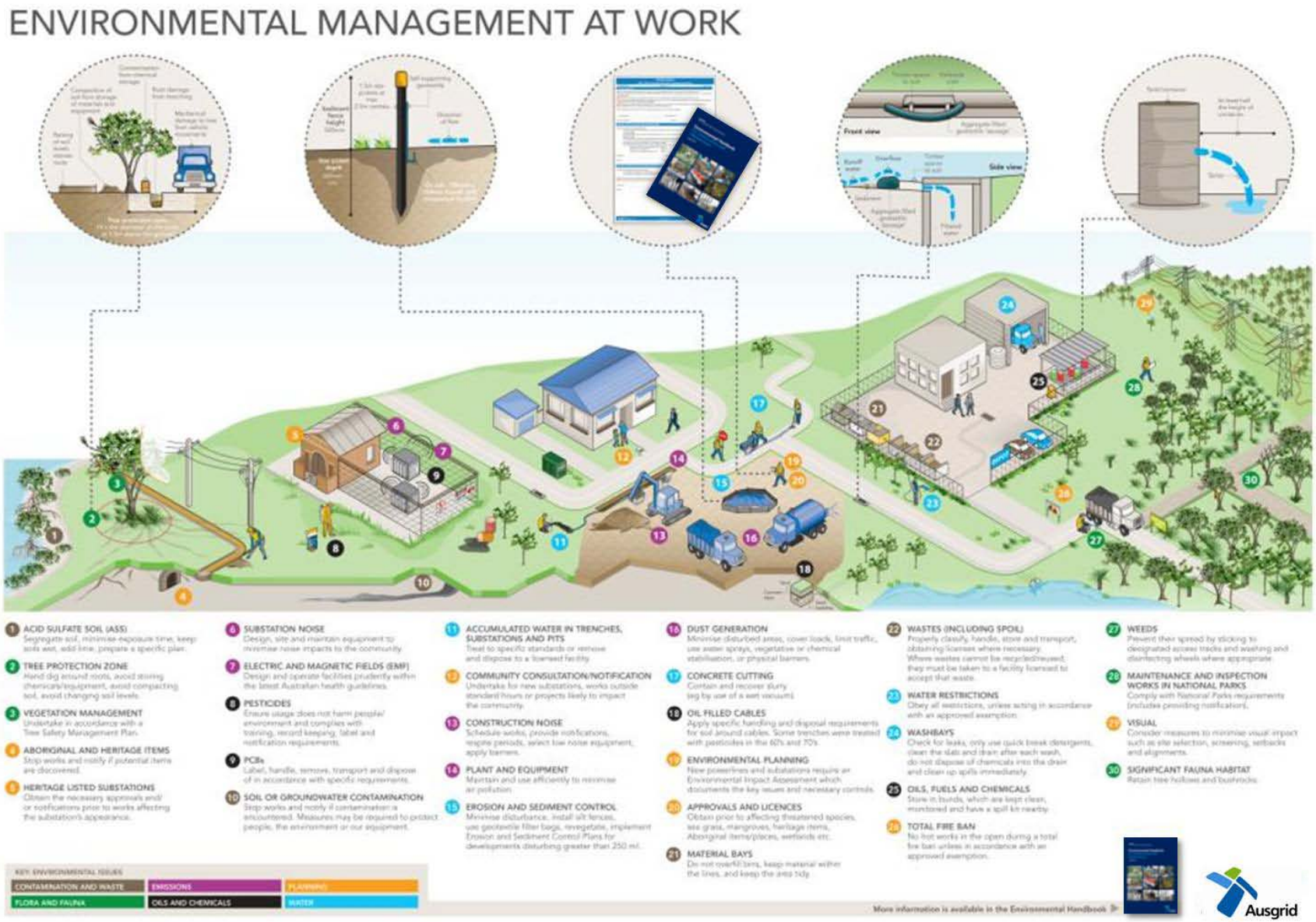
4.1.2 Impacts

ISO 14001 defines an environmental impact as any change to the environment, whether adverse or beneficial, wholly or partially resulting from a company's aspects. The environment being the surroundings in which Ausgrid operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation with the global system.

Environmental impacts that are managed by Ausgrid include:

- air quality
- climate change
- construction and operational noise
- contaminated land
- ecology
- electric and magnetic fields (EMF)
- environmental planning approvals
- erosion and sedimentation
- fluid filled cables
- greenhouse gas emissions
- heritage (Aboriginal and non-Aboriginal)
- oil, fuels and chemicals
- oil filled equipment in service
- pesticides
- polychlorinated biphenyls (PCBs)
- resource use
- visual amenity
- waste
- water quality

Figure 4-1: Ausgrid's key activities that interact with the environment



4.2 Project environmental risk assessment

At a project level, individual projects are assessed in accordance with Ausgrid procedures which are based on an approach consistent with NSW planning department guidelines, typically by way of an EIA Worksheet or a Review of Environmental Factors. More information is available on Ausgrid's Environmental Planning website

4.3 Strategic environmental risk assessment

4.3.1 Risk identification

In 1996, Ausgrid first identified the risks of our activities, products or services to be able to evaluate them for significance, and to monitor and communicate them to the company. When we understand our risks we can establish and maintain environmental objectives and targets in line with continuous improvement.

We regularly undertake risk reviews of Ausgrid's aspects to confirm our activities and risks. Information sources used during these reviews include:

- our annual report
- organisational chart
- applicable legal, permit, licence and other requirements to which Ausgrid subscribes
- purchasing data
- Safe Work Method Statements
- Safety Data Sheets
- waste contract reports
- incident / inspection debriefs
- meetings with relevant stakeholders.

During each risk review, the suitability of each aspect within the risk assessment process is examined by confirming whether structural changes or changes to their activities have occurred since the last review. If a new activity, product and service is identified or where there is a material change to the aspect, these areas are considered for inclusion in the next program and assessed during the next risk review for their relevance in the process.

Results of these risk reviews are then incorporated into an integrated risk assessment database that is used to collate and analyse the data, identifying key aspects and impacts for the company. The process also provides traceable links between aspects, impacts and risk controls.

Each aspect will be reviewed at least every two years and those areas with higher risks will be assessed annually. The assessment frequency for each area is recorded in EMShare. The risk reviews are recorded using a real-time form called an environmental risk record.

4.3.2 Risk analysis

Once the aspects are confirmed, we then quantify the level of the risk (and hence the significance of the environmental impact) by a process of risk analysis. Information from Quality Action Requests (QARs), Work Improvement Notices (WINs), incidents and inspections relevant to the aspect are used to assist in selecting the appropriate level of consequence and likelihood.

Ausgrid has adopted a bow-tie risk assessment methodology for all its business risk areas. This process is repeated annually and feeds into the company's objectives, targets and programs (refer to section 4.4). Further information is available in BRM-001 Business Risk Management (Bow-tie methodology) Policy & Procedures. A process overview is depicted in Figure 4-3.

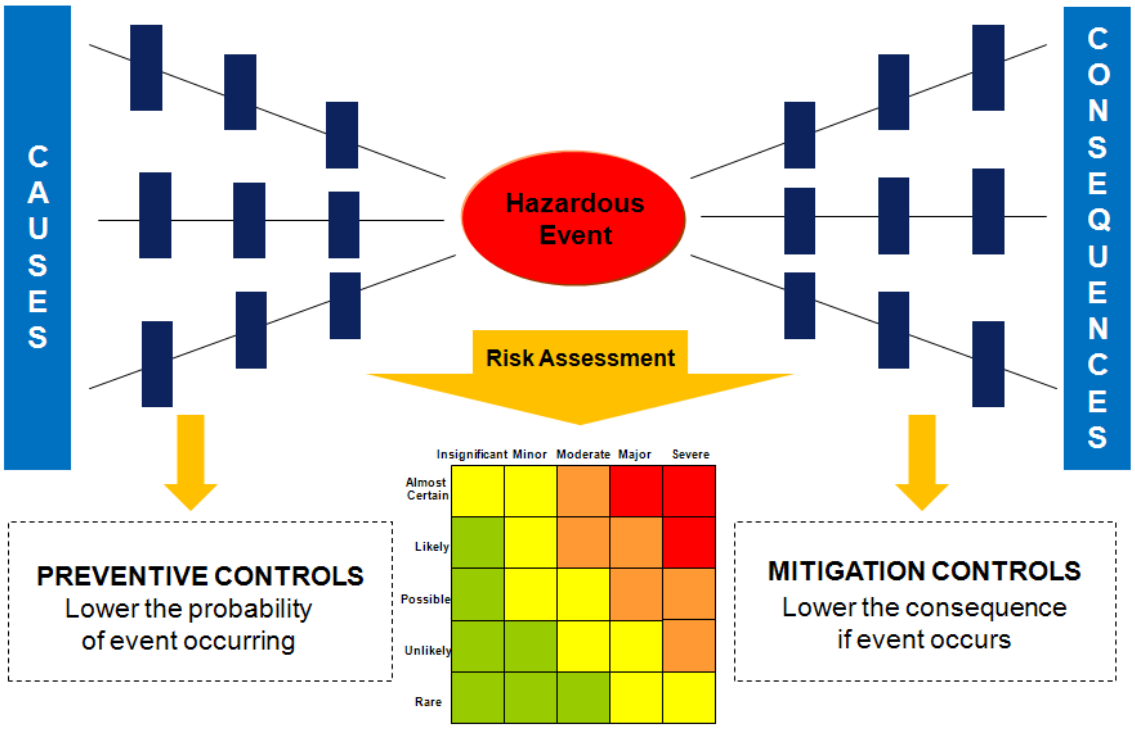


Figure 4-2: Ausgrid's bow-tie risk methodology

A company-wide risk matrix (refer to Figure 4-2) is used to evaluate the consequence and likelihood and the resulting risk level. In determining the likelihood category, the option which seems most reasonable with respect to the consequence should be chosen.

In determining the consequence category, each criterion should be individually assessed to determine the most reasonable score. The overall score should be based on the highest score obtained from each criterion.

It should be noted that the objective of the risk analysis process is to provide a rational classification system for determining those risks which are comparatively more significant. The accuracy of the data, while important, will only be determined as far as reasonably practicable to meet the intended objective.

Assigning weightings to both objective risks and control effectiveness allows calculation of the control's priority and the residual risk. Where the residual risk is high, the controls are revisited to mitigate that risk to an acceptable level.

4.3.3 Strategic assessment

The next step is to collate the risk reviews and assess any global legal changes and trends of incidents, inspections and QARs using the EMShare By Issues page. As part of this process we review our objectives to look for gaps and weaknesses against (refer to section 4.4.1).

The annual environmental planning is based around setting objectives, identifying areas for improvement and determining controls necessary to mitigate that risk. This is documented in the Annual Environmental Risk Assessment database.

4.3.4 Business risk assessment

Finally, the annual environmental risk assessment information is fed into the Ausgrid annual business risk assessment program to set objectives, identify areas for improvement and determine controls necessary to mitigate that risk for the company.

Workshops are held to conduct the business risk assessments with relevant stakeholders. During these workshops, controls, innovations and areas for improvement are analysed and recorded, covering all the identified risks.

During the risk assessment program, if a weakness or improvement is identified, then treatment actions are developed and prioritised to address the risk exposure against the objectives and targets. Where the residual risk is unacceptable, additional or revised controls are identified. Treatment actions are recorded in the relevant risk profile and collated into Ausgrid's risk management plan, which is a list of projects necessary to mitigate risk deemed unacceptable (section 4.4.4). Where the residual risk is deemed acceptable, the controls and other minor improvements are recorded and tracked in EMShare.

4.3.5 Communicating significant aspects or impacts

The top risk areas associated with the significant environmental impacts are known as our significant environmental aspects. Information about our aspects and impacts is available on the Environmental Index.

The Environmental Handbook for Construction and Maintenance (NUS 174C) is used to communicate relevant aspects and impacts to field workers. Environmental risk areas and treatment actions are available to all staff. The Environmental Risk Assessment Register, incorporating aspects, impacts, controls, areas for improvement, key risk contributors and relevant legislation is available to Environmental Services (ESU) staff (restricted access).

Figure 4-3: Ausgrid risk matrix

			CONSEQUENCE				
			Insignificant	**Minor**	**Moderate**	**Major**	**Severe**
LIKELIHOOD	Probability of event occurring >5 times in 1 year.	Almost Certain	**Medium**	**Medium**	**High**	**Extreme**	**Extreme**
	Probability of event occurring >1 in 1year but ≤5 times in 1year.	Likely	**Low**	**Medium**	**High**	**High**	**Extreme**
	Probability of event occurring >1 in 10 years but ≤1 in 1 year.	Possible	**Low**	**Medium**	**Medium**	**High**	**High**
	Probability of event occurring >1in 25 years but ≤1 in 10 years.	Unlikely	**Low**	**Low**	**Medium**	**Medium**	**High**
	Probability of event occurring – <1in 25 years.	Rare	**Low**	**Low**	**Low**	**Medium**	**Medium**
Safety			Low level injury/symptoms requiring first aid only	Non-permanent injuries/work related illnesses requiring medical treatment	Significant non-permanent injuries/ work related illnesses requiring emergency surgery or hospitalisation for more than 7 days	Permanent injuries/ work related illnesses to one or more persons	One or more fatalities Significant permanent injuries/ work related illnesses to one or more persons
Network			SAIDI impact*: <15 seconds (CBD) < 15 seconds (urban) < 35 secs (rural) < 85 secs (long rural) Supply outage to less than 0.5% of customers for a period less than 4 hours Momentary outage to one or more Sensitive Load Customers where there is no impact to the Customer's operations or the public.	SAIDI impact*: 15 secs – 2mins (CBD) 15 secs - 5 mins (urban) 35 secs - 12 mins (rural) 85 secs - 28 mins (long rural) Supply outage to 0.5% to 1% of customers for a period less than 4 hours. Interruption affecting one Sensitive Load Customer for less than 30 minutes, where there is little impact on the Customer's operations or the public.	SAIDI impact*: 2 mins - 8 mins (CBD) 5 mins - 10 mins (urban) 12 mins - 24 mins (rural) 28 mins - 280 mins (long rural) Supply outage to 1% to 5% of customers or critical infrastructure for a period less than 4 hours. Interruption affecting one Sensitive Load Customer for: a) a short time but where there is significant impact (eg CBD, hospital) b) an extended period of time.	SAIDI impact*: 8 mins - 36 mins (CBD) 10 mins – 50mins (urban) 24 mins - 240 mins (rural) 280 mins - 560 mins (long rural) Supply outage to 5% to 10% of customers or critical infrastructure for a period in excess of 4 hours Several significantly sensitive customers for: a) a short time but where there is significant impact (eg CBD, hospital) b) an extended period of time.	SAIDI impact*: > 36 minutes (CBD) > 50 minutes (urban) > 240 minutes (rural) > 560 minutes (long rural) Supply outage to more than 10% of customers or critical infrastructure for a period in excess of 24 hours Many significantly sensitive customers for: a) a short time but where there is significant impact (eg CBD, hospital); or b) an extended period of time.
			* A measure of the impact of the event on the overall System Average Interruption Duration Index (SAIDI) performance for the organisation calculated using the organisation's total connected customers as the base.				
Finance#			Ausgrid = <$0.5M, End/Ess =< $250K	Ausgrid = $ 0.5 M - $10M, End/Ess = $250K - $5M	Ausgrid = $10M - $50M, End/Ess = $5M - $25M	Ausgrid = $50M - $100M, End/Ess = $25M - $50M	Ausgrid = >$100M, End/Ess = > $50M
			# Scaled according to respective Network revenues.				
Compliance			Indication of interest from Regulator. No fines incurred but administration costs may be payable. No litigation.	Warning/ notifications from Regulator. Minor financial penalties. Short term duration litigation.	Medium financial penalties. Medium duration litigation.	High financial penalties. Lengthy litigation.	Significant financial penalties. Potential jail term for individuals. Extensive litigation. Loss of Operational Licence.
Reputation			Public concern restricted to local complaints or intra-industry knowledge / awareness	Attention from media and or heightened concern from local community / external stakeholders. Criticism from multiple sources for one or two days.	Adverse national media/public/stakeholders attention sustained over 1-2 weeks. Issue likely to be referred to a politician or lobby group	Significant adverse national media/public/stakeholders attention sustained over a month. Loss of confidence by State government minister. Directive to amend practice received from regulators.	Significant adverse national media/public/stakeholders outcry. Sufficient outcry to cause irreparable damage to brand Ministerial enquiry / Royal Commission
Environment			Limited localised damage to minimal area of low significance	Minor impact on biological or physical environment, or heritage item over a limited area. Little or no need for remediation.	Moderate damage over a large area or affecting ecosystem ,or heritage item. Moderate remediation is required.	Serious widespread, long term damage to ecosystem or heritage item. Significant rectification is required.	Very serious long term, wide spread impairment of ecosystem or heritage item.

EMS overview

4.4 Objectives, targets and programs

ISO 14001 (4.3.3): *establish and review environmental objectives, targets an environmental management program to achieve those objectives and targets.*

4.4.1 Objectives

Our significant aspects and impacts form the basis for setting the company's objectives and long term strategies. Objectives are derived during the business risk assessment program (refer to section 4.3). The objectives and targets are measurable where practicable (refer to section 4.4.2) and consistent with our environmental policy.

4.4.2 Targets

For each impact, we have developed an objective, targets and key performance indicators. The results of the business assessment are reviewed and agreed upon with the key aspects (those contributing to the larger proportion of the company's environmental risks) and then with the Environmental Steering Committee (ESC).

Ausgrid's risk management plan is a list of projects with targets, due dates and responsibilities. Our Environmental Sustainability Improvement Plan (ESIP) is now integrated into the risk management plan (the environmental component of the plan). Further targets are outlined in Ausgrid's Scorecard, EMShare environmental management actions (ESU restricted), and ESC actions. These targets can feed into the Performance Development System (PDS) process for staff.

4.4.3 Key performance indicators

ISO 14001 (4.3.3.3): *develop and use performance indicators.*

Environmental performance is the measurable results of the management of our aspects. Ausgrid's EMS is measured using our ESIP and other key performance indicators reported to the ESC. Lagging performance indicators include the number of:

- reportable pollution incidents
- fines, prosecutions or licence breaches
- incidents that damage vegetation or heritage without required approvals
- disposals to a facility which is not lawfully allowed to accept that waste or failure to stop works after encroaching contamination
- noise complaints involving the Environmental Protection Agency (EPA) that are non-compliant.

Leading performance indicators include the:

- number of environmental inspections undertaken
- percentage of environmental field investigations with required environmental documentation onsite
- percentage of EIAs with no key omissions identified via EIA Worksheet audit program
- percentage of scheduled PCBs removed within 5 years.

4.4.4 Programs

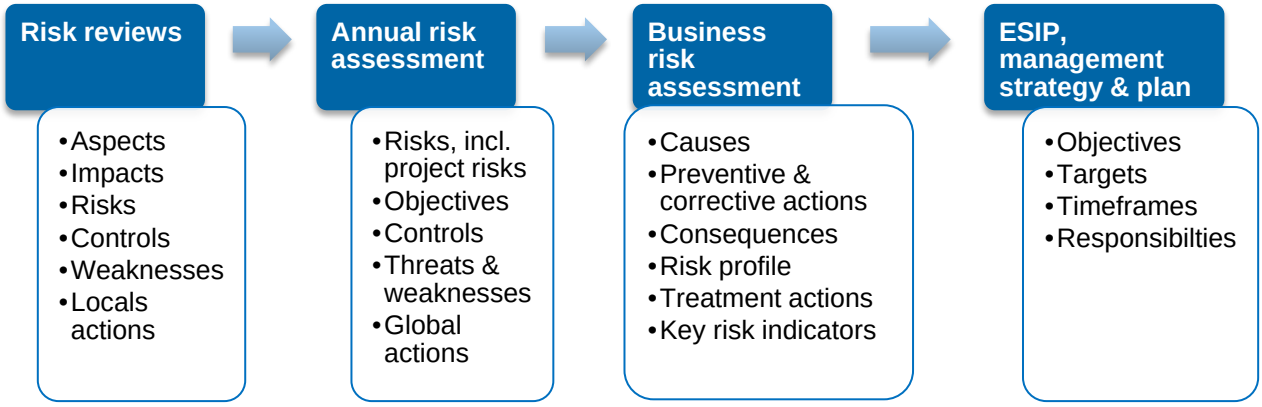
EMS overview

Ausgrid's environmental management program is called the ESIP, which is established for each financial year. A Networks NSW Strategic Environmental plan is currently under development. Ausgrid established an Environmental Sustainability Strategy to provide direction to minimise our environmental impacts, promote a culture of innovation and be a leader in environmental responsibility. This strategy outlines three key objectives:

1. reduce our resource use
2. minimise our environmental impacts
3. actively contribute to reducing carbon emissions in the wider community.

As environmental laws, and consequently the regulator's focus, are typically aimed at managing impacts, a management strategy and plan is developed for each of Ausgrid's identified impacts. Each strategy consists of objectives, legal requirements, legal changes, training, guidelines, risk contributors, incidents, audits and risk controls. An overview of the environmental risk assessment process is depicted in Figure 4-4

Figure 4-4: Environmental risk assessment process



4.5 Legislation summary

EMS overview

ISO 14001 (4.3.2): *identify and update legal and other requirements relevant to the environmental aspects of the company's activities.*

4.5.1 Legislation register

Ausgrid is required to act in accordance with all relevant legislation. Ausgrid's LR-001 Legislative Register 2013 lists the key relevant legislation for the company's activities. A range of legislation is listed under the business risk category BR 6 Environment. Ausgrid acknowledges there is overlap between safety, property and environmental requirements; however the scope of the EMS is defined by the responsibilities under environmental legislation. Requirements such as those under the *NSW Dangerous Goods (Road and Rail Transport) Act 2008* and W*ork Health and Safety Act 2011* are specifically excluded from the EMS and are managed via Be Safe System.

Our EMS assists compliance with the environmental laws by systematically identifying, interpreting, deploying and recording regulatory requirements that affect our aspects. The regulatory environment consists of existing and emerging:

- legislation
- regulations
- regulator agreements
- codes of practice
- case law decisions
- industry standards
- Australian standards
- national management strategies
- guidelines
- control orders
- company decisions and directives
- approvals.

Ausgrid's applicable environmental legislation and summaries of requirements are located in the EMShare Legislation Register.

4.5.2 Monitoring legislation

ESU identifies and monitors the regulatory environment on a continuous basis via:

- a formalised updated EnviroLaw Directory service provided by Environmental Essentials
- literature surveys (such as Strategic Information Unit, internet sites, Environmental Manager, Australian Environment Business Network (AEBN))
- membership of industry forums (such as AEBN, Electricity Network Environment Group Committee, ENA Committees)
- attendance at seminars and conferences
- other legal update services (such as National Environmental Law Association (NELA), Clayton Utz, Office of Environment and Heritage (OEH), Environmental Defender's Office (EDO))
- government gazettes and the NSW Legislation website and update service
- liaison with regulatory bodies
- liaison with government departments
- liaison with other Ausgrid workers.

4.5.3 Interpretation

ESU then interprets the organisational implications of the regulatory environment and assesses the regulatory environment's impact on Ausgrid's aspects. Changes in environmental legislation are monitored, recorded and dealt with through the EMShare Change Register.

Any required actions will be allocated to a responsible person with a completion date and progress tracked via the Change Register. All changes to legislative and other requirements are allocated under the following priority categories:

- **Low:** No action required. For information only or maintain a watching brief.
- **Medium:** Minor action required. Low risk exposure.
- **High:** Action required to address risk exposure.
- **Extreme:** Major action required. High risk exposure.

Depending on the change, ESU will determine how best to disseminate the requirements via one or more of the communication channels listed in section 5.3. The Change Register also records this dissemination process.

A monthly review of legislative changes is undertaken by ESU and findings are reported to the Executive. Regular reports are also prepared for ESC meetings and the Board. As part of the regular ESC meetings, an Environmental Legislation Update will be tabled to each meeting unless regulatory changes dictate otherwise. The purpose of the 'Environmental Legislation Update' agenda item is to promote discussion and to provide the committee with an update of:

- key environmental regulatory changes relevant to Ausgrid
- a summary of associated opportunities and threats for Ausgrid
- proposed actions undertaken to address these threats and opportunities.

4.5.4 Amendments and distribution

Changes in regulatory requirements may mean amendments need to be made to various documents. Before any amendments are published, the person requesting the change will provide relevant background information to the Issuing Authority to be used for review purposes. The Issuing Authority is the relevant approver for a particular publishing environment (such as Ausgrid's website, Balin, The Wire or EMShare).

Once the relevant Issuing Authority has approved the proposed amendment, the document shall be re-issued as a revised edition of the original document and the details of changes updated. Controlled documents will be distributed to enable traceability and facilitate the amendment of documents. New or amended copies of controlled documents must be forwarded to all recipients on the distribution list for that particular document as required.

Our aim is to adapt required environmental changes across the company quickly, widely and well. This is achieved by assessing the need for change, to avoid unnecessarily disrupting workers in an already heavily changing workplace. Managers and supervisors are the preferred providers of information to Ausgrid workers because they have generally developed better relationships with their staff. Environmental team brief items are issued each month and are the preferred dissemination method for legislation changes that affect a number of workgroups and where the information needs to be discussed with staff. ESU representatives can also attend these team brief meetings if needed.

4.6 Legal requirements

4.6.1 Environmental law

Ausgrid is required to act in accordance with all relevant environmental legislation. Environmental legal obligations affect all levels of operation, from long-term network planning decisions, through to line construction and maintenance. Ausgrid through its officers, employees, managers, directors and contractors must:

- conduct proper impact assessment and obtain the requisite planning approvals and pollution licences
- avoid harm to the environment in the course of conducting business and
- report any incidents immediately in accordance with Ausgrid policies.

Refer to NUS174 Environmental Procedures for further details on planning and pollution laws applicable to Ausgrid's activities.

4.6.2 Offences and penalties

Modern environmental laws contain potentially severe sanctions in the event of default by the corporation, including large fines, conviction of corporate officers and remedial orders or injunctions that may delay a project or render it commercially unviable.

The heaviest sanction applies under the Federal legislation, where the maximum fines for breaches of the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) are $5,500,000 and a possible seven years jail time.

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes a three tiered hierarchy of environmental offences.

1. Tier One offences (maximum $5,000,000 / 7 years jail) - may be imposed where a company or an individual is found by the Court to have, negligently or wilfully (actual intention and wilful blindness to the possible consequences of an action):
    - disposed of waste in a manner which harms or is likely to harm the environment
    - caused any substance to leak, spill or otherwise escape in a manner that harms or is likely to harm the environment or
    - caused any controlled substance (under the *Ozone Protection Act 1989*) to be emitted into the atmosphere in contravention of the regulations and in a manner which harms, or is likely to harm the environment.
2. Tier Two offences (maximum $1,000,000 / 1 year jail) - is for all other offences under the POEO Act, which cover the areas of air, noise, water and land pollution, in addition to ancillary offences for non-compliance with notices, licence provisions and directions of authorised officers.
3. Tier Three offences (typically $1,500) - are minor tier two offences that may be dealt with by way of an "on the spot" fine or a penalty infringement notice.

Although fines remain the most common penalty, the POEO Act (s254) permits the court to also order an offender to take such steps as are necessary to prevent, control, abate or mitigate any harm to the environment, make good any environmental damage resulting from the offence, or prevent the continuance or recurrence of the offence.

Other sentencing options available under the POEO Act include:

- orders to pay costs, expenses and compensation incurred by a public authority in connection with the prevention, control, abatement or mitigation of any harm to the environment caused by the offence (s245)
- orders for compensation to a person who suffers loss or damage to property because of an offence, or incurs costs or expenses in preventing, mitigating (or attempting to do so) such loss or damage (ss246 and 247)
- orders to pay investigation costs incurred by the prosecutor or by other regulatory authorities
- orders requiring the publication of the conviction in newspapers (s251)
- environmental service orders which relate to a specified project which will provide a benefit to the environment of a public place or for the public benefit (s250)
- environmental audit orders (s250)
- payment into environmental trust or to an environmental company (s250)
- order to attend training or to establish a training course (s250).

Other consequences for non compliance include damage to reputation (career and company), clean up and rehabilitation time and costs, and employment termination.

All relevant environmental offences and penalties are summarised in the EMShare Legislation Register.

4.6.3 Liability

With the exception of Tier One offences under the POEO Act, most offences created by environment protection legislation are strict liability offences (Tier Two). This means that the state of mind of the offender is not taken into account when determining liability for the offence. Consequently, once the facts establishing the offence are proved, the defendant is liable unless a defence can be established. The prosecution is not required to prove that the person committing the offence held an intention or other culpable state of mind. The defence of 'honest and reasonable mistake' (section 4.6.5) may, be available in very limited circumstances.

In the case of both Tier One and Two offences, each person who is a director, or who is 'concerned in the management' is also taken to have committed the offence. Under general corporate law, courts have broadly interpreted those 'concerned in the management' need not be part of the board, nor even executives, they can include site or plant managers.

A company is criminally responsible for the acts of its employees, even if the employee may have done their job in a way that is not approved by the company. A company might also be liable for the acts of independent contractors and their employees, depending on the level of supervisory control exercised over their activities.

An 'occupier' under the POEO Act is a person who has the management and control of a premise or the current licence holder (Ausgrid holds a number of environmental licences). The occupier of premises from which pollution has occurred is taken to have caused the pollution, unless the occupier proves that someone other than an agent, licensee, employee, contractor, or subcontractor was responsible and that the occupier took reasonable steps to prevent the pollution. What constitutes 'reasonable steps' is not defined in the POEO Act, but it is thought that the meaning of this term will correspond closely with 'due diligence' (refer to section 4.6.5).

4.6.4 Factors for prosecution

In the event of an offence, a number of factors are considered as outlined in the NSW environmental prosecution guidelines:

- the seriousness or triviality of the offence
- the harm or potential harm to the environment
- any mitigating or aggravating circumstances
- the degree of culpability of the alleged offender
- the availability and efficacy of any alternatives to prosecution
- whether the offender has already been dealt with by non-prosecutorial means
- whether the offence is a continuing or second (or more) offence
- the prevalence of the offence and the need for deterrence
- the length of time since the offence was committed
- the length and expense of the Court hearing
- the likely outcome of a conviction
- any precedent which may be set by not instituting proceedings
- whether others are to be prosecuted in relation to the same incident.

The basic consideration of whether to prosecute an employee or a manager / director, is to determine who is responsible for the offence: who committed the act, who formed the intention, and who created the material circumstances giving rise to the breach.

Factors used to consider whether to prosecute an employee include:

- whether they knew or should have known that the activity was probably illegal
- the seniority of the employee and the scope of duties
- whether the employee took reasonable steps to draw the attention of the employer (or other party) to the impropriety of the practice leading to the offence.

Factors used consider whether to prosecute a manager or director include whether:

- there is evidence linking a director or manager with the company's illegal activity
- the person had control over the company in relation to the criminal conduct.

Note: An employee who acted in good faith and followed a specific environmental procedure is unlikely to be prosecuted.

Factors used to consider how penalties are imposed by the Land and Environment Court (POEO Act s241) include the:

- extent of harm or likely harm to the environment
- practical measures which could have been taken to prevent, control, abate or mitigate any harm
- extent that the offender could reasonably have foreseen the harm or likely harm
- extent that the offender had control over the causes which gave rise to the offence
- the offender, in committing the offence, was complying with orders from an employer or supervising employee.

4.6.5 Defences

A defendant would need to satisfy the court of these key statutory defences under the POEO Act:

- s118, which provides a defence for both corporations and individuals (only for Tier One offences) where:
  - the commission of the offence was due to causes over which the defendant had no control and
  - the defendant took all reasonable precautions and exercised due diligence to prevent the commission of the offence.
- s169(1), which provides a defence to any charge under the POEO Act for directors and managers who can show that:
  - the person was not in a position to influence the conduct of the corporation in relation to its contravention of the provision or
  - the person, if in such a position of influence, used all due diligence to prevent the contravention by the corporation.

Note: A 'no knowledge' defence doesn't exist. Managers and senior management need to demonstrate due diligence was exercised to prevent the offence, or prove that they had no influence over the conduct of the corporation in relation to the offence.

Honest and reasonable mistake of fact defence

In rare circumstances for Tier Two and Three offences, it may be possible to rely on what is called the defence of honest and reasonable mistake. The defence is not available for Tier One offences, as these serious offences all require the wrongful conduct to be carried out wilfully or negligently. This defence can only apply where the accused has an honest and reasonable belief in a state of affairs (facts) which, if true, would not only mean that the accused would not have committed the crime charged, but also no wrongful act at all. This defence will only be established if:

- the mistake is one of fact not law
- there is actually a mistake and not just mere ignorance on the part of the person relying on the defence
- the mistake is both honest and reasonable and
- but for this mistake, the act the subject of the charge, would be an innocent act.

This defence is not available where a person has only a general understanding of events or was under a general assumption that everything was in order.

Lawful authority defence

The defence of 'lawful authority' may be raised where conduct is authorised by an authority issued under the POEO Act. Most commonly, such authorisation is by an environment protection licence. Authorisation of conduct by a regulatory authority under another statute (for example, a Part 5 approval or development consent granted under the *Environmental Planning and Assessment Act 1979* (EP&A Act) will not be sufficient to make out this defence.

Due diligence defence

The concept of 'due diligence' attempts to encourage sound environmental management by making it a defence to certain offences if the person or company used all due diligence to prevent the offence (POEO Act ss118 and 169(1)). Due diligence is not defined in the POEO Act, but the cases indicate that it implies:

- directors and managers must identify all environmental risks and sources of existing or potential environmental harm and introduce measures and procedures to ensure that these risks or sources of harm are adequately addressed
- directors and managers must take reasonable precautions to prevent the commission of an offence (typically evidence of an EMS aimed at ensuring environmental compliance and the prevention of environmental harm
- an environmental compliance plan should identify both the activities of the company which could give rise to an incident, set out applicable legal requirements and identify the persons or positions responsible for management of the activity
- the requirements of due diligence depend on the circumstances of the case, but involve a mind that is concentrated on the likely risks
- due diligence is not satisfied by precautions that are merely usual in the industry, unless also designed to prevent the contravention
- whether the company or a director took the precautions that ought to have been taken is a question of fact that will be decided objectively according to the standard of a reasonable person in the circumstances
- it is not an answer for the company or a director to say that they did the ‘best’ that could be done given the resources available.

4.6.6 Practical application for managers

The due diligence defence will not apply for a generic EMS and also depends on the coordinated actions of Ausgrid workers and the systems in place to direct those actions. Since the due diligence defence is not available for Tier Two offences, we must ensure that contracts with contractors (including ASPs) are appropriately structured to ensure that the risks to Ausgrid are reduced in situations where the contractor or ASP has caused pollution or environmental harm.

Ausgrid has developed a mature, robust, specific and certified EMS as outlined in this manual. It is not enough to merely establish a system, but to demonstrate due diligence we need to ensure that our EMS is:

- **implemented** on site and throughout the company to create a culture of environmental compliance
- **reinforced through training programs,** to ensure workers are aware of the company’s environmental program and understand the environmental risks associated with activities carried out on site
- **regularly monitored** with a system for reporting non-compliance
- **regularly reviewed** to ensure that it is operating effectively
- **improved** when necessary to address increased standards or to ensure that environmental issues are brought to the attention of the company or its officers.

Note: EF 060 Due diligence checklist for managers may assist an individual (and the corporation) by preventing an offence in the first instance and mounting an adequate defence in the second.

5 Implementation and operation

EMS overview

5.1 Resources, roles and responsibilities

ISO 14001 (4.4.1): *define, document and communicate roles, responsibilities and authorities through appropriate training of employees in order to effectively manage environmental issues.*

Resources include human resources and specialised skills, organisational infrastructure, technology and financial resources. Adherence to the environmental policies is the prime responsibility of management, every employee and all contractors.

Workers must be aware of Ausgrid's policy and operating procedures for effective management and operation to ensure compliance with the policy. Environmental responsibilities are defined, documented and communicated in our Environmental Code of Conduct, which is publicly available on Ausgrid's website.

Specific responsibilities are defined in relevant procedures, plans and charters such as the ESU Charter and the ESC Charter. Company delegations and authorities are outlined in DEL002 Delegations and Schedules. Specific environmental delegations are under development.

Environmental Services is charged with the responsibility of ensuring that Ausgrid's EMS is established, implemented, maintained and progress reported to management, including recommendations for improvement.

As a general guide, the EPA has advised that any employee who acted in good faith and followed a specific environmental procedure is unlikely to be prosecuted. General environmental responsibilities within Ausgrid are outlined in section 7.1.

5.2 Competence, training and awareness

EMS overview

ISO 14001 (4.4.2): *identify training needs and provide appropriate training.*

Any person(s) performing tasks on behalf of Ausgrid that have potential to cause significant environmental impacts will be provided with appropriate environmental training. The purpose of Ausgrid's environmental training system is to:

- define the methods used to establish the current environmental training program
- ensure workers have adequate environmental training and competence to perform their duties
- meet legislative and statutory requirements.

This section outlines the procedures for identifying and delivering Ausgrid's environmental training system.

5.2.1 Training needs analysis

A training needs analysis is undertaken annually as part of the environmental risk assessment program. This analysis aims to ensure that all Ausgrid workers performing specifically assigned tasks are aware of their environmental responsibilities and are adequately qualified where necessary.

The analysis is conducted with relevant aspect representatives and a number of factors are considered including, for example:

- changes in legislation or procedures
- trends in incident rates
- number and types of QARs and WINs issued
- results of audits or inspections and any non conformances
- specific individual or workgroup needs.

Results of the training needs analysis are submitted for inclusion into the Ausgrid training matrix (available on The Wire).

5.2.2 Environmental training program

The current Environmental Training Program is available on the Environmental Index and is also posted on Ausgrid's Training and Development page. All environmental training courses are listed in the EMShare Training Register. However, not all courses in this register are deployed each year. A needs analysis determines which courses will be run as part of a particular year's environmental training program, depending on priorities and resources.

Tutorials have been introduced to provide short video instructions for various environmental requirements and activities. Environmental tutorials are also listed in the Training Register and are available on ET001 Environmental Training.

The content of each environmental training course are designed to address:

- **Conformity** - environmental courses are prepared to highlight the importance of conformity with Ausgrid's environmental policy and procedures. Each course is designed to explain that it is paramount that workers understand that their role includes implementing Ausgrid's policies, procedures and EMS.
- **Tailored** - although each environmental course is delivered using the standard material, it is expected that preparation be undertaken prior to each session delivery in order to specifically tailor the content to each audience by providing relevant information about Ausgrid's significant environmental aspects and impacts. This makes the training more effective by relating the actual or potential impacts associated with the specific work group's activities. To assist in making the course relevant to workers, each course outlines the benefits of complying with our EMS, as outlined section 2.1.
- **Consequences** - each training course discusses the potential consequences for failing to comply with Ausgrid's environmental requirements. Depending on the training course, examples of potential consequences can include those outlined in section 4.6.2.
- **Understanding roles** - each course explains how the audience can comply with environmental requirements by defining the roles and responsibilities of the audience as outlined the Environmental Code of Conduct. Each course additionally explains specific requirements of the audience's role or activities.

5.2.3 Implementation

Managers and supervisors are responsible for ensuring contractors and employees under their control are provided with adequate supervision, information, instruction or training to complete designated responsibilities and tasks. An employee training plan shall be developed and implemented by managers and supervisors. These plans should be prepared in accordance with Be Safe Pro08 Training and Compliance.

Managers and supervisors should check that appropriate training has been completed. Employees should advise their manager or supervisor if they feel they have not been provided with adequate resources or training to complete designated responsibilities and tasks.

5.2.4 Inductions

Ausgrid has a compulsory Environmental Awareness Induction Program. For Ausgrid staff, managers and supervisors are responsible for inducting all staff in their section and including relevant environmental information relating to the duties and activities undertaken by the employee. Once all items have been covered to the satisfaction of both the employee and the Manager/Supervisor or delegated representative, the completed and signed checklist should be included in the employee's history file (in SAP).

For others such as temporary staff, contractors and visitors, Contractor Officers / Supervisors are typically responsible for contractor environmental inductions. All visitors and contractors need to be made aware of environmental issues and risks within their work area. Where inductions are appropriate, the person engaging a visitor to Ausgrid is responsible for ensuring visitor inductions are completed. Records are to be maintained in accordance with internal system requirements.

For project specific inductions, ESU may be engaged to present an initial site environmental induction, explaining key risks and controls for that project and location.

5.2.5 Training notification

Workers are advised of initial environmental training relevant to their work via a number of methods including the company online induction program, induction checklists, the Ausgrid Training and Development site, the Environmental Index, broadcast emails, targeted emails or environmental newsletters.

Environmental courses are logged in Ausgrid's Training Management System (TMS) (in SAP), including the frequency of refresher training. Automatic reminder emails notify workers when their refresher training is due (typically three months in advance). Managers are sent automatic email reports of their workers due for training.

5.2.6 Training modes and delivery

Ausgrid has established various mechanisms to ensure skill and competency:

- Training - training courses or on-the-job
- Instruction - practical demonstrations, coaching on-the-job
- Information - provision of information verbal, written etc
- Supervision - observations and management.

Training tools, materials and/or learning experiences that support competency based outcomes should consider differences in learning, language, literacy and numeracy skills of trainees. Learning modes may include:

- Documents - eg Environmental Guidelines and Environmental Handbook
- Specialist instruction - eg TAFE Pesticides Training for operational staff
- On-site Induction - eg Toolbox talks
- On-the-job demonstration and supervision - eg ESU inspection/workshop program
- Face-to-Face courses for field-based training - eg Sediment Control, Environmental Awareness, Environmental Impact Assessment, PCB Awareness, Oil Spill Response, Construction Manager, Discharging water etc
- Computer assisted learning for predominantly theory-based training - eg Environmental Induction, Waste, Environmental Impact Assessment, Environmental GIS and Licence Compliance training courses available on Ausgrid's elearning site.
- Joint company training programs - eg Be Safe Days, Apprentice Field Inductions and Advanced Supervisor Training by providing an environmental session as a component of the broader program.

5.2.7 Assessment & verification

A number of courses have examinations to assess the participant's level of competency. The Environmental Awareness course requires the participant's Network Passport to be stamped on passing the examination. Trainers for this course are issued with Ausgrid stamp with a unique trainer identification number.

EIA Worksheets must be prepared by competent persons who have undertaken adequate training. Ausgrid reserves the right to require a person who submits an EIA Worksheet to submit evidence of completing Ausgrid's training or other appropriate accreditation to assess the environmental impact of a project.

Contractors, labour hire employees or visitors to site shall also have their training verified prior to commencing work. This shall be performed through contract specifications, tender evaluation, inductions and monitoring processes.

5.2.8 Records and data collection

Training sessions, course attendance (EF 001) and examination results are entered in the TMS and hardcopies will be kept in the relevant training folder retained at the ESU Sydney office. If a training session includes more than one specific training course then a copy of the attendance sheet should be included in each hardcopy folder.

Ausgrid's elearning system (on Moodle) automatically records completion and examination marks. The benefit of online training courses and examinations is that the details are automatically recorded for the course, eliminating errors associated with manually entering course information into a database.

Those persons responsible for conducting inductions should ensure all employees, contractor, labour hire and visitor induction records are maintained in accordance with internal system requirements. EF 408 Environmental Site induction record must be completed to document the topics and attendees of the induction. Managers must ensure confidential training and assessment records are kept in the SAP.

5.2.9 Trainer experience & qualifications

Trainers should hold a Certificate IV in Training and Assessment if possible, otherwise they should be suitably experienced in the environmental issues covered in the training course.

A presenter's kit is available for each course for ease of preparation. Kits include items such as background information, course participants lists, course evaluation forms, examinations, handouts, relevant guidelines and other supporting material. Electronic trainer's guides are also available to ESU.

5.2.10 Review & evaluation

At the end of each course the trainer will distribute Course Evaluation forms (EF 002) to attendees. Feedback data from course attendees will be collated and reviewed. This will provide a basis from which the course can be assessed for its effectiveness. Evaluation records and results of the assessment will kept in the relevant hard copy training folder.

Employee performance reviews are an ideal opportunity for managers to include environmental training as Key Performance Indicators (KPIs) in an employee's PDS. The PDS ensures Ausgrid staff all work towards achieving common organisational, divisional, branch and section business goals. Training Plans should be reviewed on an annual basis in accordance with PDS requirements.

Information on developing a PDS can be found via Ausgrid's Performance and conduct page. The Ausgrid Training matrix is designed to help workers and managers select the training courses relevant to their work activities. An Environmental Training matrix is also available on the Environmental Index and ESU can assist in selecting the appropriate courses.

Environmental training modules are reviewed and updated at least every 2 years to ensure relevance and currency of the training material. Ideally the course content should be reviewed prior to each session to ensure all details are current and correct. Due to IT restrictions, online training can only be updated every 6 months. In all cases, an EMShare Training update register is maintained for non-urgent changes.

The Environmental Training System and Program outlined in this manual is to be reviewed and updated annually by ESU.

5.3 Communication

EMS overview

ISO 14001 (4.4.3): *establish procedures for internal and external communications relating to environmental aspects of the company.*

Ausgrid's procedure for handling internal communications and receiving, documenting and responding to relevant communication from external interested parties is outlined in this section.

5.3.1 Internal communication

Ausgrid uses a variety of communication channels to ensure that employees receive up to date environmental information. Environmental requirements are communicated according to Ausgrid's Be Safe Pro06 Consultation and Be Safe Pro07 Communication.

ESU disseminates information using one or more of the following forms listed below.

- Connect on The Wire
- 'What's New' on EMShare
- Environmental Matters newsletters or Planning Update emails
- guidelines
- training packages
- auditing programs
- team briefs
- instructions
- verbal and written advice
- meeting minutes
- bulletin-board postings
- ESC
- suggestion box email address: greenisgood@ausgrid.com
- other company channels, such as Inside Ausgrid, Corporate Directives, Weekly Broadcasts etc.

Key incidents, complaints, actions, reports and records are recorded in EMShare. This system is sufficient for ensuring that requests for technical support that require further investigation are tracked to completion (the volume and benefit from the data received wasn't deemed to be cost effective..

5.3.2 External communication

Environmental communications received from external stakeholders are also managed by ESU, such as:

- The Energy & Water Ombudsman NSW (EWON), Chief Operating Officer Correspondence and general pubic enquiries are recorded via Ausgrid's Community liaison process.
- EMF enquiries are recorded in the EMShare EMF Enquiries register
- noise complaints are recorded in the EMShare Incident register
- regulator correspondence is recorded in TRIM and linked to the relevant EMShare register.

Ausgrid has agreed to report our environmental performance publicly in our Annual Report (available on the website) which aims to provide a balanced representation of its performance on a range of social, environmental, economic, financial and corporate governance issues. The content of our Annual Report is guided by the:

- Global Reporting Initiative Sustainability Reporting Guidelines for the Electric Utility Sector Supplement
- Energy Supply Association of Australia Sustainable Practice Framework.

An ESU mailbox has been established for receiving communications from contractors, external ASPs and staff (environmentalservices@ausgrid.com.au).

A waste recycling and purchasing policy (WRAPP) mailbox has been established for receiving communications from Ausgrid workers for WRAPP reporting, as well as sending external communications to OEH (wrapp@ausgrid.com.au).

5.4 Documentation

EMS overview

ISO 14001 (4.4.4.): *document the system, either in paper or electronic form.*

Ausgrid's EMS documentation includes:

- our environmental policy, objectives and targets (section 0)
- a description of the scope of the EMS (section 1.1)
- a description of the main elements of the EMS and their interaction, and reference to related documents (this manual)
- documents, including records, required by ISO 14001 (section 0)
- documents, such as organisational charts, emergency plans, determined by Ausgrid to be necessary to ensure the effective planning, operation and control of processes that relate to its significant aspects (TRIM).

A guideline user map for the Environmental Services is available on the ESU library (access restricted to ESU).

A full list of Ausgrid's systems and tools and resources is available on the Wire. Procedures and key documents are available in electronic format which has key search facilities on words and phrases and provide direction to related areas of the standard. Environmental procedures are available to workers via these systems:

1. TRIM - stores final environmental documents and records
2. Environmental Index on The Wire - provides environmental information and links guidelines, documents, records and external information
3. EMShare on SharePoint - stores environmental management records
4. SAP - stores environmental training and workers records
5. Balin on the intranet - links technical standards and information, including environmental guidelines
6. Ausgrid's website - lists Network Standards, also for external use
7. Field tablets - downloads information and guidelines for field workers
8. Ausgrid's Environmental planning website - provides information, guidelines, templates and calculators for preparing EIAs for minor and predictable works, which is available externally
9. TIBCO - stores EIA Worksheets
10. Env GIS - stores and displays spatial environmental data
11. Ausgrid Procedures Database - all other Ausgrid procedures
12. Network Operation's Documentation Database – division specific procedures
13. Connect - environmental communications.

5.5 Document control

EMS overview

ISO 14001 (4.4.5): *establish document control procedures for routine operations.*

All documents are controlled to ensure that they can be easily identified, properly authorised, have current versions available and obsolete documents can be removed from use. DMU 04 Ausgrid's Document Management Policy/Procedures and Be Safe Pro09 Document Control are in place to control documentation and records.

The Environmental Style Guide and templates outlines our procedure to:

- approve documents for adequacy prior to issue
- review and update as necessary and re-approve documents
- ensure changes and the current revision status of documents are identified
- ensure relevant versions of applicable documents are available at points of use
- ensure documents remain legible and readily identifiable
- ensure documents of external origin determined by Ausgrid to be necessary for the planning and operation of the EMS are identified and their distribution controlled
- prevent unintended use of obsolete documents and apply suitable identification to them if they are retained for any purpose.

The ESU Review Guide is used to ensure that changes to environmental requirements and new or updated documents are consistently available through all relevant resources, and that all key stakeholders are informed of the change.

Ausgrid holds a GovCopy Licence which allows employees to print, email, scan or download licensed copyright material, or photocopy or fax 10 percent of the pages, 10 percent of the number of the words or one chapter of a book or one article from any journal issue.

5.6 Operational control

EMS overview

ISO 14001 (4.4.6): *identify and plan operations that are associated with the significant environmental aspects.*

Ausgrid's environmental procedures, responsibilities and requirements are communicated via the environmental guidelines listed on the Environmental Index. These operational procedures are called Environmental Hazard Guidelines and:

- document the process to control situations where their absence could lead to deviation from the environmental policy and targets
- stipulate the operating criteria
- are related to our significant aspects
- are communicated to relevant stakeholders including suppliers, contractors, ASPs.

Ausgrid also has Be Safe Hazard Guidelines which provides process for controlling hazardous operations.

A hierarchy of controls is adopted to prevent pollution and environmental harm. To address Ausgrid's carrying influence of control, procedures such as Procurement procedures, Be Safe Pro12 Design, Be Safe Pro14 Purchasing of Goods and Be Safe Pro15 Contractor Safety Management are in place.

5.7 Emergency preparedness and response

EMS overview

ISO 14001 (4.4.7): *define and maintain procedures for responding to accidents and emergency situations and review and revise these procedures after an occurrence.*

Emergency response procedures (Be Safe Pro16 Emergency Preparedness and Response), provide the necessary support within Ausgrid to address the needs of workers, facilities and equipment in the event of unplanned emergency situations should they occur. Environmental Services is charged with the responsibility of coordinating the response to actual emergency situations and accidents, as well as preventing and mitigating associated environmental impacts.

Ausgrid has site specific emergency plans which include Pollution Incident Response Management Plans (PIRMPs).The process for responding to environmental emergencies or incidents is outlined for all workers in the NUS 174C Environmental Handbook and specifically for ESU in EG 001 ESU Incident Response guidelines. Further detail is available on the Ausgrid Incident management page and the Environmental Incident page.

Our emergency preparedness and response procedures are reviewed regularly and, in particular, after the occurrence of emergency situations. They also consider:

- the nature of on-site hazards, eg flammable liquids, storage tanks and compressed gases, and measures to be taken in the event of spillages or accidental releases,
- the most likely type and scale of an emergency situation and the most appropriate method for responding to the situation
- internal and external communication plans
- mitigation and response actions for different types of emergency situations to minimise environmental damage
- post-incident evaluation to establish corrective and preventive actions (Be Safe Pro19 Incident Investigation)
- periodic testing of our emergency response procedures
- training of emergency response workers
- evacuation routes and assembly points
- emergency contact details (eg fire department, spillage clean-up services).

6 Checking

EMS overview

Checking involves measurement, monitoring and evaluation of the company's performance. Preventive action should be used to prevent problems before they occur. Corrective action should be used to correct problems in the EMS.

Ausgrid's activities and system is monitored and measured via these mechanisms:

1. environmental inspections - using EF 002 Environmental Inspection Checklist or EF 004 Environmental Depot Checklist and recorded in the EMShare Environmental Site Inspection register.
2. EIA Worksheet audits (using EF 17450 Verification Checklist) and site inspections (EF 17410 EIA Site Inspection checklist) recorded in the EIA Inspection register
3. manager/supervisor compliance audits as required (via environmental inspections, safety interactions, worksite observations etc as specified in Be Safe Pro20 Workplace Inspection, Testing and Monitoring and Be Safe Pro22 Auditing)
4. monitoring and measuring - refer to section 6.1
5. annual ESC charter review (using ESC 001 Charter review checklist)
6. annual management review program (using EM 005 Management review checklist).

6.1 Monitoring and measurement

ISO 14001 (4.5.1): *monitor practices which can impact on the environment.*

Ausgrid monitors and measures contaminated land and groundwater via the contaminated lands program. This program is recorded in the EMShare Contaminated Sites register.

Internal measuring is also undertaken of issues such as acid sulphate soils, noise and EMF. Ausgrid also engages external consultants for a range of measuring services. These services are recorded in the EMShare Specialist studies register.

Ausgrid's EMF, noise and pH monitoring and measuring equipment are regularly calibrated. Records of this equipment are in the EMShare ESU Assets register. Calibration records are kept by the Network Test section. Calibration dates are stamped on the equipment to ensure the equipment is suitable for use.

6.2 Evaluation of compliance

ISO 14001 (4.5.2): *develop procedures for handling identified non-compliance and for initiating and implementing corrective action.*

The objectives of Ausgrid's environmental inspection program are to:

- determine the performance and conformance of Ausgrid's activities with respect to environmental legislation, applicable best practice guidelines and internal requirements
- demonstrate the principles of due diligence
- continually improve Ausgrid's environmental performance, by:
    - recommending suitable actions to address environmental risks

- where possible, immediately correcting environmental concerns during or around the time of the inspection
- directly implement or coordinate recommended actions or refer identified issues to relevant workers, as soon as practical after each inspection

- monitor ongoing environmental performance at depots.

All inspections are for the sole purpose of a voluntary audit under Part 6.3 of the POEO Act.

6.2.1 Inspection scope

This inspection procedure covers the conduct of various environmental inspections of Ausgrid's activities or the activities of contractors working for Ausgrid.

Safety issues are specifically excluded from these inspections, however safety issues should be communicated to workers being inspected or referred to safety services using a Hazard Alert Form for further action. Hazard Alert forms should be completed when a near miss has occurred or, a potential safety, property damage, or other incident has been identified in the workplace. Hazard Alert books can be obtained from Ausgrid's Print Shop (reference A.36).

Note: Other Ausgrid staff can issue a Hazard Alert form to ESU for a potential or actual environmentally related issue that might be identified. The form should indicate that the near miss was identified and the green copy should be forwarded to ESU to ensure that the appropriate corrective and preventative actions are taken.

Note: While the inspection process is to identify the potential for incidents, all actual environmental incidents or serious issues should be immediately reported to ESU on 9394 6659 or 0412 070 574.

6.2.2 Program preparation

ESU is responsible for arranging the preparation and approval of an environmental inspection program. The purpose of the program is to ensure that relevant areas within Ausgrid are inspected to confirm compliance. The inspection program is based on the following inputs where relevant:

- Ausgrid's environmental risk assessment program
- Ausgrid aspects (sections, projects or activities) and associated impacts
- previous inspection results
- environmental incidents
- EMS requirements
- statutory requirements (for example, licence requirement, consent condition etc)
- EIA requirements
- regulatory changes
- internal requests.

ESU will review the inspection program prior to commencement and can require unscheduled inspections to be carried out at any time.

6.2.3 Preparing for a site inspection

Prior to conducting an environmental inspection, the Inspector shall:

- obtain a copy of the EF 002 Environmental Inspection Checklist and complete the inspection details at the beginning, including specifying the scope of the inspection
- have a general knowledge of the processes, relevant disciplines, and technology used by the area being inspected
- contact the relevant Ausgrid manager to organise a suitable time and date for the inspection, confirm if there will be a representative(s) present, confirm the scope of the inspection, and clarify any particular site requirements, for example, site induction, restricted areas, safety issues
- where relevant, request and review background information for the inspection such as copies of licences, previous inspections, WINs, QARs, EIAs, Species Impact Statement, Operational Environmental Management Plans, Construction Environmental Management Plans, Development Application conditions of approval, project descriptions, training registers, site diaries, inspection or monitoring records, site meeting minutes, project files, complaints register or technical instructions.

6.2.4 Conducting an inspection

The Inspector will conduct an opening meeting with the Ausgrid manager or representative(s) to:

- complete a Hazard Assessment Checksheet (HAC) or any safety inductions required for the site
- confirm any special conditions relating to the site, for example, site induction, safety procedures, restricted areas, need for guides, timing of critical activities for observation, specific information required
- confirm that all site workers are aware of the inspection and the appropriate site workers to approach for information
- explain the objective and scope of the inspection
- clarify any details or questions
- confirm that any non-conformance would be issued as a QAR
- agree on a time for the closing meeting and the workers to be present.

The Inspector will conduct the inspection using EF 003 Environmental Inspection Checklist and any other relevant information as a guide to record conformance, innovations, observations, major and minor non-conformances according to Table 6-1, and collect evidence through relevant documents, interviewing workers and photographs.

6.2.5 Conducting facilities inspections

The following environmental issues may be addressed when inspecting of facilities and activities at Ausgrid's depots:

- bulk and minor storage and handling of oils, including PCB oil and other chemicals
- availability of spill clean-up equipment and procedures

- handling and storage of solid waste streams, including recycling issues, asbestos storage and conformance with waste licences
- maintenance and effectiveness of washbays, separators and interception tanks
- conformance with requirements for discharge of trade waste to sewer, including documentation checks
- any visibly apparent soil contamination and activities causing or likely to cause contamination of land
- condition of refuelling facilities
- emissions to atmosphere including dust generation in open areas
- noise levels
- damage or potential damage to vegetation on the depot or adjacent lands
- water pollution issues arising from sedimentation and erosion
- conservation of the heritage value of depots where relevant
- community complaints arising from depot activities
- availability and appropriateness of environmental emergency response procedures
- general housekeeping
- environmental incidents that have occurred on the site and appropriateness of the actions taken, including a check of the incident register.

The following issues are specifically excluded from the depot or facility inspections, however these issues may be noted and referred to the appropriate Ausgrid section for further action:

- dangerous goods handling and safety issues, however safety issues should be referred to safety services using an Hazard Alert Form for further action
- issues relating to ozone depleting substances (eg sulphur hexafluoride, fire extinguishers, refrigerants)
- EMF issues
- all uses and facilities associated with administrative buildings / areas (ie offices).

6.2.6 Closing the inspection

The Inspector will conduct a closing meeting at the completion of the on-site inspecting activities and prior to leaving the site, where practicable, with the Ausgrid manager or representative(s) to:

- discuss the preliminary findings, especially any findings that require immediate corrective action
- agree on the basis for the inspection findings, especially non-conformance and resulting WINs or QARs
- determine the workers responsible for implementing the corrective actions and a timeframe for action to be implemented
- make arrangements for the supply and return of any outstanding information required to complete the inspection should also be made at this time
- confirm that any non-conformance will be issued as a WIN or QAR

- the Inspector shall email an inspection summary to the Ausgrid manager or representative(s)
- assign actions according to magnitude and assess the effectiveness of actions.

6.2.7 Inspection Summary

At the conclusion of the site inspection, the Inspector will review the findings to determine the degree of conformance. Each finding will be given a rank as follows according to Table 6-1.

The Inspector will prepare an Inspection Summary using email and include:

- a summary of issues observed
- nominate the workers responsible for implementing the corrective actions
- a timeframe for action to be implemented as agreed during the closing meeting
- request notification when and how the issues have been addressed
- any positive issues identified
- any safety issues observed during the inspection.

Alternatively, the EMShare record can be converted to PDF and emailed to the workgroup as an attachment.

If the issue can be resolved by consulting with workers within ESU or by undertaking actions which ESU have the capability to undertake, it is the responsibility of the Inspector to rectify the issue and sign off when the issue has been addressed. Issues beyond the capability of ESU shall be referred to the Ausgrid manager or representative(s) to action as agreed in the closing meeting. The Inspector will forward the Inspection Report to the Ausgrid manager or representative(s) for the actions to be completed. Actions will be evaluated according to section 6.2.

6.2.8 Environmental inspection database

Relevant details, such as the issues covered by the inspection, WINs or QARs issued and follow up required, are entered into the EMShare Environmental Inspection database by the Inspector. The database will assist in tracking the corrective actions required by the inspection and in providing progress and summary reports for the environmental inspection program.

Completed inspection checksheets and any inspection notes are recorded electronically for each inspection according to the area inspected and year inspected in the directory (G:\ENVIRO\Projects_Auditing).

6.2.9 Review

ESU will utilise the reporting functions in the Environmental Inspection database to arrange for the results of the inspections carried out during each inspection program period (typically an annual cycle) to be reviewed, analysed and documented in a summary report after the completion of each program period. The results of this review will be used in the preparation of the next inspection program and in the ongoing development of Ausgrid's ESIP.

Table 6-1Inspection rank definitions

Finding	Meaning	Rank	Follow Up	Corrective action
Conforms	Full Conformance - Conforms to the inspection criteria or the intent of the inspection criteria.	✓	No follow up is required.	WIN or QAR not required.
Positive initiative	Conformance via an innovative method that could be considered for use across the company.	P	Inspector records the innovation for consideration in the next ESIP.	WIN or QAR not required.
Observation for improvement	Minor technical infringement of internal procedures or low risk lapses of environmental controls, which are not clear breaches of environmental standards. *For example, some records not up-to-date; one stockpile sediment control inadequate but no risk of off-site migration. If there is evidence of a recurring pattern then these should be classified as minor or major non-conformances*.	O	Inspector notes observation in Inspection Summary. Ausgrid Manager fixes area of concern and advises ESU of the corrective action. Inspector checks for subsequent inspections and records whether the observation should be considered in the next ESIP.	WIN or QAR not required.
Minor Non – conformance	Evidence of substantial conformance but not complete conformance with statutory requirements or management systems where there is low risk (i.e. low consequence and low likelihood) of environmental harm or fines/ prosecution. *For example, incomplete licence monitoring data because of a one-off equipment failure; missing an inspection of sediment controls following one rainfall event where there is evidence of good on site erosion & sediment control; conformance with nearly all impact assessment undertakings or DA conditions where the lapses are not considered by the inspector as environmentally or legally significant.*	M	Inspector notes finding and recommendations in Inspection Summary.	For Internal staff: Inspector issues corrective action in Inspection Summary and records in EMShare including agreed remedial steps and timeframe. If the action can not be appropriately managed via EMShare, then issue a QAR. For Contractors: Inspector provides Inspection Summary to Ausgrid Manager with agreed remedial steps and timeframe. Ausgrid Manager implements corrective action within agreed timeframe and makes file note of corrective action. Ausgrid Manager and Inspector make file note of corrective action. Records whether the minor non-conformance should be considered in the next ESIP.

Finding	Meaning	Rank	Follow Up	Corrective action
Major non - conformance	Non-conformance with statutory requirements or a failure in management systems that could lead to significant risk of environmental harm; damage to corporate reputation; loss of business; and/or fines/ prosecution. For example, • a leak, spill or other escape or deposit of a substance causing or threatening material harm to the environment • degradation of the land requiring significant remediation of Ausgrid or other property • damage to a substantial area of land or water resource or of significant value. (i.e. nature reserves, parks or unique habitats) • major impacts on fauna / flora and habitat, negative impacts on ecosystem function • legal issues where prosecution or on-the-spot fines are likely • widespread long term loss of customers and/or future business • widespread long term social impacts & adverse media • significant disciplinary action required.	X	Ausgrid Manger addresses the issue as a matter of priority within agreed timeframe. Considers raising it as an 'environmental incident' or referring via Ausgrid's IMS process. Inspector notes finding and recommendations in Inspection Summary.	For Internal staff: Inspector issues QAR that includes agreed remedial steps and timeframe. For Contractors: Inspector communicates non-conformance with the relevant Ausgrid Manager. Ausgrid Manager and Inspector make file note of corrective action. Inspector implements corrective action within agreed timeframe and makes file note of corrective action. Records whether the major non-conformance should be considered in the next ESIP.

6.3 Nonconformity

EMS overview

ISO 14001 (4.5.3): *deal with actual and potential nonconformities by taking corrective action and preventive action.*

Corrective actions are assigned to eliminate the cause of a detected nonconformity, whereas preventive actions are assigned to eliminate the cause of a potential nonconformity. Ausgrid's Be Safe Pro23 Corrective and Preventive Action aims to:

- identify and correct nonconformities by taking action to mitigate their environmental impacts
- investigate nonconformities, determining their cause and taking action in order to avoid their recurrence
- evaluate the need for action to prevent nonconformities to avoid their occurrence
- record the results of corrective actions and preventive actions taken
- review the effectiveness of corrective actions and preventive actions taken.

For all major non-conformances and reportable incidents (excluding cable leaks), system non conformances, near misses or improvement opportunities are recorded in the EMShare WIN Register. If the actions are not completed in the agreed timeframe, a QAR will be issued. Bow-tie risk assessments are undertaken for non-conformances that lead to prosecution. Actions taken shall be appropriate to the magnitude of the problems and the environmental impacts encountered. Global actions are likely to require changes to EMS documentation.

The following criterion is used to evaluate the root cause of a major non-conformance or reportable incident:

- People: Communication breakdown
- People: Inexperienced staff
- People: Unaware of procedures
- People: Unwilling to follow procedures
- People: Requirements not on site
- People: Poor job / site design
- People: 3rd party provided no / incorrect info
- Poor Planning: design/EIA
- Poor Planning: tool box/ prework
- Places: Site contains contributing factors
- Places: Contaminated land
- Places: Limited / difficult site access
- Processes: Procedures inadequate
- Processes: Training course inadequate
- Processes: Responsibilities not defined
- Processes: Inadequate document control
- Processes: Technology limited
- Processes: Scope changed or not defined
- External: Weather
- External: Sabotage / vandalism
- External: 3rd party
- External: Force majeure
- Equipment: Equipment failure
- Equipment: Equipment misused
- Equipment: Equipment wrong for job
- Equipment: Equipment not maintained
- Equipment: Equipment doesn't meet specification
- Equipment: Inadequate environmental controls

6.4 Control of records

ISO 14001 (4.5.4): *establish systematic record keeping.*

Records provide evidence of the ongoing operation and results of the EMS. Ausgrid has DMU 04 Ausgrid's Document Management Policy/Procedures in place to control documentation and records. These procedures specify the identification, storage, protection, retrieval, retention and disposal of records to ensure they remain legible, identifiable and traceable.

Environmental records include:

- complaint records
- training records
- process monitoring records
- inspection, maintenance and calibration records
- pertinent contractor and supplier records,
- incident reports,
- records of tests for emergency preparedness,
- audit results
- management review results
- external communication decision
- records of legal requirements
- records of significant aspects
- records of environmental meetings
- environmental performance information
- legal compliance records
- communication with interested parties.

Confidentiality of information is in accordance with Ausgrid's Document Classification System. ESU's record register is available on the ESU library (access restricted).

6.5 Internal audits

ISO 14001 (4.5.5): *implement a program and procedures for periodic EMS audits.*

System Audits are conducted internally to determine whether the documented system procedures are being followed and to determine the effectiveness of the system to the appropriate standards, legislation, regulations and codes of practice. The results of system audits are provide to management to ensure they make informed business decisions.

Auditor independence is demonstrated by using the Internal Audit to ensure objectivity and the impartiality of the audit process.

7 Management review

EMS overview

ISO 14401 (4.6): *review the system and its suitability and effectiveness in achieving its objectives.*

Maintaining an EMS involves obtaining ongoing commitment and leadership from Ausgrid's top management to improve environmental management.

The ESC is an Ausgrid executive sub-committee, which assists our Board and Executives to discharge their responsibilities of environmental compliance to achieve our objectives. The environmental risk assessment program and the ESIP are reviewed annually by the ESC. Progress against the ESIP is reported quarterly to the ESC and monthly through Ausgrid's risk management process.

ESU provides the secretariat role for the ESC and is also charged with the responsibility of reviewing and reporting on system performance in the form of an annual EMS Review (EM 005). This review is undertaken annually and reported to the ESC. Input to management reviews typically include

- results of internal audits and compliance inspections legal and other requirements
- communications from external interested parties, including complaints
- the environmental performance of the company
- the extent to which objectives and targets have been met
- the status of corrective and preventive actions
- follow-up actions from previous management reviews
- intended or proposed changing circumstances, including:
    - new or updated legal and other requirements related to its aspects
    - restructures or changes in the company's aspects
    - advances in science and technology
    - lessons learned from incidents and inspections
- recommendations for improvement.

The outputs from management reviews will include any decisions and actions related to possible changes to environmental policy, objectives, targets and other elements of the EMS consistent with the commitment to continual improvement.

7.1 Continual improvement

Ausgrid continually evaluates our environmental and EMS performance to identify opportunities for improvement. Information for continual improvement is gathered from:

- results of the management reviews
- experience gained from corrective and preventive actions
- external benchmarking against best practices
- results of monitoring of key characteristics of operations
- views of interested parties, including employees, customers and suppliers.

Agreed improvements are then adopted in Ausgrid's next ESIP.

8 Responsibilities

8.1.1 All workers

It is the responsibility of all workers to:

- comply with the requirements in all relevant environmental documents
- use due care, skill and foresight to minimise environmental harm
- act in good faith when performing your job
- speak up when you think an environmental document is missing or cannot be followed, when something appears to be wrong, you are not sure what to do, or something could be improved
- immediately report environmental incidents to your supervisor or ESU.

8.1.2 Managers and supervisors

In addition to the above requirements, it is the responsibility of managers and supervisors to:

- understand environmental risks and legal requirements relevant to your area of influence
- check there are specific procedures and instructions for your workers to effectively manage environmental risks
- ensure environmental documents are accessible to your workers
- check your workers have adequate supervision, training and resources to comply with procedures and instructions
- ensure there are appropriate contingency plans for dealing with environmental emergencies
- check environmental performance and discuss the results with your manager
- investigate all relevant environmental concerns
- share information with other areas of the company
- communicate, advocate and coach workers through environmental change
- manage resistance to environmental change through leadership, support and being a role model for the change
- offer a suitable time to conduct an environmental inspection when requested by an inspector
- cooperate with the environmental inspector
- provide relevant information throughout the inspection
- rectify any non-conformances identified during the inspection process and consider any inspection observations.

8.1.3 Environmental inspectors

It is the responsibility of environmental inspectors to:

- plan and carry out inspections in the environmental inspection program in accordance with section 6.2
- be independent, appropriately trained and competent
- communicate and consult with the inspectee
- prepare and distribute inspection reports
- monitor any corrective actions and follow up to completion
- maintain inspection file records
- enter inspection results into the Environmental Inspection Database and file hardcopy records appropriately.

8.1.4 Environmental Services section

It is the responsibility of ESU to:

- manage environmental compliance for the company within its scope
- prepare, monitor, coordinate actions under the ESIP and reporting against it through the ESC
- prepare, monitor and update significant environmental impacts and aspects
- facilitate, prepare, monitor and update environmental risk records and the risk assessment register
- prepare, monitor and update the environmental management strategies
- identify changes in regulatory and industry environmental requirements
- interpret the organisational implications of the regulatory environment
- review the formalised quarterly and major update of legislative and regulatory changes
- disseminate information to workers in a clear, concise manner that encourages effective implementation of that change
- communicate regulatory issues via reports to the ESC and other reports as required
- coordinate and support the ESC
- arrange the preparation, review and approval of the environmental inspection program
- monitor progress against the environmental inspection program
- prepare a summary report after the completion of each inspection program period.

8.1.5 Aspect (Branch) managers

It is the responsibility of the aspect managers to:

- ensure all activities, products and services are assessed for environmental risk and the aspects and impacts are recorded in the environmental risk records
- ensure adequate environmental controls to ensure the identified significant risks are incorporated into aspect processes.

8.1.6 Environmental Steering Committee

It is the responsibility of the ESC to:

- monitor overall progress and effectiveness of the environmental inspection program
- review and endorse the ESIP, as well as allocate priorities, resources and authority for actions under the ESIP within its scope
- review the local, annual and business environmental risk assessments
- review the environmental management strategies
- review the key environmental regulatory changes relevant to Ausgrid
- review a summary of associated opportunities and threats for Ausgrid, including subsequent proposed actions undertaken to address these threats and opportunities

8.1.7 Networks NSW, Board, CEO, COO and Executive

It is the responsibility of Ausgrid's top management to:

- recognise that environmental management is among the highest company priorities, establish and maintain communication and constructive relations with internal and external interested parties
- identify the aspects of the company's activities, products and services
- identify the legal and other requirements that relate to the company's aspects
- ensure the commitment of management and all persons working for or on behalf of the company to the protection of the environment, with clear assignment of accountability and responsibility,
- encourage environmental planning throughout the product or service life cycle
- establish a process for achieving environmental objectives and targets
- provide appropriate and sufficient resources, including training, to comply with applicable legal and other requirements, and to achieve environmental objectives and targets on an ongoing basis,
- evaluate environmental performance against the company's environmental policy, objectives and targets and seek improvement where appropriate
- establish a management process to audit and review the EMS and to identify opportunities for improvement of the system and resulting environmental performance
- encourage contractors and suppliers to establish an EMS.

New South Wales
TREASURY

Valuation of Electricity Network Assets
A Policy Guideline for New South Wales Distribution Network Service Providers

February 2004

Contents

Introduction

The purpose of these guidelines is to provide practical guidance for the valuation of the network assets of Distribution Networks Service Providers (DNSPs) in NSW. The Guidelines are designed to achieve a consistent and transparent approach to network asset valuation based on independently determined and generally accepted valuation principles. The Guidelines will be used in the preparation of future valuations for submission to IPART in its determination of regulated network prices.

These guidelines were originally developed for NSW Treasury by GHD Group and Andersen with assistance of the NSW Distribution Network Service Providers, and subsequently updated by Sinclair Knight Merz following the valuations of the NSW DNSPs in 2002.

NSW Treasury will put in place a mechanism for the ongoing amendment of the Guidelines.

1. General Principles

1.1 Introduction

The purpose of these guidelines is to provide practical guidance for the valuation of network assets of Distribution Network Service Providers (DNSPs) in New South Wales for regulatory pricing purposes. The Guidelines are designed to achieve a consistent and transparent application of the Optimised Depreciated Replacement Cost (ODRC)[1] approach to asset valuations.

These Guidelines are not intended for use in the valuation of network assets of Transmission Network Service Providers (TNSPs) in New South Wales that provide a support function to the TransGrid transmission network. The valuation of such assets would be subject to the Australian Competition and Consumer Commission (ACCC) *Statement of Principles for the Regulation of Transmission Revenues (June 2002)*.

1.2 Background

Due to the capital-intensive nature of electricity networks, capital related costs represent a significant proportion of annual revenue requirement. Return on and return of capital constitute over 70% of electricity distributors' base revenue requirement. The value of the regulated asset base is, therefore, a critical input into the determination of regulated charges and provides an important signal for efficient pricing and future investment.

A well-defined asset valuation methodology is required in order that the regulatory objectives of transparency and consistency are achieved.

Under the coordination of the Council of Australian Governments (COAG), the electricity distributors in New South Wales, Victoria, Queensland, South Australia and the Australian Capital Territory have created a National Electricity Market (NEM). The NEM commenced on 13 December 1998, establishing a single wholesale market for electricity. Additionally, those States participating in the NEM provide users with the ability to negotiate electricity supply and the price paid for this supply. As the transmission and distribution market is characterised as a "natural monopoly", the Australian Competition and Consumer Commission (ACCC) and various State based regulators have taken on the role of industry regulators, being responsible for the regulation of prices and revenues.

In assuming their role as regulators of revenues in the NEM, the aim is to adopt a regulatory process which eliminates monopoly pricing, provides a fair return to network owners, and creates incentives for managers to pursue ongoing efficiency gains through cost reductions.

Regulators permit DNSPs to earn a reasonable (risk adjusted) return on their investment capital, provided the market continues to value the services produced with that capital. It is therefore necessary to assess the value of system and non-system network supply assets so that an appropriate return on assets can be calculated.

[1] The Optimised Depreciated Replacement Cost (ODRC) is also referred to as the Depreciated Optimised Replacement Cost (DORC) approach.

The arrangements for the operation of the NEM are set out in the National Electricity Code (NEC). The terms of reference for the code are based on the application of the National Electricity Law, which gives the code force of law. The code establishes the procedure for determining the annual aggregate revenue requirements (AARR) of each distribution network provider and sets out the requirements for valuing the initial capital base.

1.3 Regulatory Framework

The objective of the regulatory framework is to balance the interest of network owners and users throughout New South Wales. The framework is based on establishing a revenue cap determined using the building block approach which involves estimating the overall cost of service to the entity. The following framework ensures positive incentives for owners and protects the value of businesses in line with the objectives of the NEC.

The building block approach has also been adopted by the ACCC for transmission companies and by the Office of the Regulator-General (ORG) for the Victorian distribution businesses.

As mentioned, the regulatory framework is an accrual building block approach based on forecasts of the cost of service over the regulatory period. The approach calculates the Aggregate Annual Revenue Return (AARR) as the sum of the three major components:

- Return on Capital
- Return of Capital
- Efficient Operating Costs

Aggregate Annual Revenue Return Formulae

AARR = return on capital + return of capital + efficient operating costs

Where Return on Capital =Initial Asset Base * Rate of return

Return of Capital = Depreciation allowance

Efficient operating costs = Operating Maintenance and Expenditure

These policy guidelines have been formulated to calculate the initial asset base component of the regulatory process. This includes the valuation of network system assets, non-system assets, land, easements and capital contributions.

1.4 IPART's December 1999 determination under the NEC

The Independent Pricing and Regulatory Tribunal of NSW (IPART) is the jurisdictional regulator under the NEC for NSW. Accordingly IPART made its first determination of distribution revenues under the NEC in December 1999.

In making it's determination, IPART adopted a valuation of the initial capital base consistent with the ODRC valuation carried out by the consortium of GHD, Andersen and Worley International. The GHD consortium carried out the ODRC valuation in accordance with NSW Treasury's Policy Guidelines for Valuation of Network Assets of Electricity Network Businesses.

IPART adopted this value, balancing the interests of stakeholders and having consideration to all information presented, including a letter from the Premier that confirmed the Government's pre-existing policies for the valuation of network assets, which included independently determined ODRC valuations.

IPART made it clear that its determination does not bind future regulatory decisions on initial capital bases for the electricity or any other industry.

1.5 Valuation Methodology

The NEC provides guidance and sets out requirements for the valuation of assets. The objectives of the distribution service pricing are detailed in clause 6.10.2 of the NEC, whilst clause 6.10.3 outlines the principles by which the regime is to be administered.

These provisions in the NEC seek to ensure that the DNSPs are provided *"… a sustainable commercial revenue stream which includes a fair and reasonable rate of return … given efficient operating and maintenance practices*" where assets are valued in accordance with a basis determined by the Jurisdictional Regulator. This valuation is to be done with regard to the agreement of the Council of Australian Governments of 19 August 1994, that *"… deprival value should be the preferred approach to valuing network assets"*.

Deprival value is described as the cost to an entity if it was deprived of an asset and was required to continue to provide goods and / or services or to deliver programs that depend on that asset. Under this concept, assets are valued at an amount that reflects the loss that might be incurred if the entity were deprived of the service potential or future economic benefits of the assets at the reporting date.

The Glossary to the NEC (Chapter 10) defines the deprival value as *" A value ascribed to assets which is the lower of economic value or optimised depreciated replacement cost"*

According to the approach, the three underlying bases that need to be considered in determining the deprival value include;

- Current Replacement Cost
- Economic Value[2]
- Net Realisable Value

Once an amount has been estimated for each of the bases, whichever is the higher of recoverable amount and the net realisable value is considered to be the Economic Value of the assets. Whichever is the lower of the Economic Value and Current Replacement Cost is the Deprival Value of the assets.

[2] The Economic value is also commonly referred to as the Recoverable Amount which is the net amount that is expected to be recovered through the cash inflows and outflows arising from the continued use of the asset.

The Economic test is integral to the process of determining the deprival value, however the assessment of the economic value in principal takes into consideration future revenues based on net present values of future cash flows generated by the assets, which raises the issue of circularity.

The ODRC approach eliminates the issue of circularity and is a valuation approach that seeks to reflect market behaviour. It is also arguable that any cash flow based valuation will, by default, include more than the just the tangible assets. It is difficult to distinguish between goodwill and fixed assets when adopting a cash flow approach.

It is also logical to assume that the maximum amount a potential purchaser would be prepared to pay for an asset is represented by the purchaser's lowest alternative cost to replicate the asset.

In its Draft Statement of Principles for the Regulation of Transmission Revenues the ACCC also supports the use of ODRC "… *given the circularity that would be associated with any deprival value assessment, a depreciated optimised replacement cost (DORC) valuation should be adopted for any initial valuation …."*

The Commission considers that a well-defined DORC approach has some significant advantages as a valuation methodology on economic efficiency grounds. It suggests that a DORC approach seeks to "….*replicate the desirable outcomes of a competitive market*."

It also states *"… any value that is in excess of DORC is likely to imply pricing of services that will expose the service provider to being by-passed …."* therefore *"… a DORC valuation actually is attempting to measure…the maximum price that a firm would be prepared to pay for 'second hand' assets with their remaining service potential ...."*

The ACCC has undertaken to develop a guideline on its approach to DORC valuations and to apply these in a consistent manner to Electricity Transmission determinations.

The International Valuation Standards as published by the International Valuation Standards Committee (IVSC) and endorsed by the Australian Property Institute and the American Society of Appraisers outlines a number of approaches available to the valuer when addressing asset valuations.

The three most commonly used approaches are;

i) the market comparison approach

ii) the income approach (or cash flow approach)

iii) the (optimised) depreciated replacement cost approach.

The market comparison approach seeks to determine the current value of an asset by reference to recent comparable transactions involving the sale of similar assets.

Where it is not possible to determine values for assets using a market comparison approach the valuer seeks to replicate the thought processes of an informed potential purchaser acting without compulsion in assessing the market value of the assets.

The ODRC is a valuation approach used to assess the value of assets for which it is not possible to apply the market comparison and/or income approach and should not be confused as a basis of value in its own right.

The ODRC is an approach normally applied to specialised assets such as those found within the electricity transmission and distribution networks.

It is also a methodology considered consistent with the building block approach.

1.6 Other Valuation Methodologies

There are a number of alternative valuation approaches available in assessing asset values. The analysis and application of historical data may be used to assist the valuer in its determination, however the use of this approach is normally dependant upon the accuracy and reliability of the data available.

Valuations based on historic cost are normally unreliable due to inconsistencies found within the asset owner's recording practices. Valuations relied wholly on this approach have been found to lead to poor investment decisions as witnessed in the USA and bear little resemblance to current market values.

Valuations based on historical costs are fraught with problems and should only be used as a secondary check method.

The Roll Forward approach is based on adjusting previously determined asset values taking into consideration inflation, depreciation and the disposal and expenditure of assets between the two regulatory periods.

The values are determined through the utilisation of an appropriate index applied to the original values. The Consumer Price Index (CPI) published by the Australian Bureau of Statistics (ABS) is often viewed as the standard benchmark for indexation and should be considered when adopting appropriate indices.

Measuring industry specific data and comparing original values of individual assets with current new replacement costs can also establish indices. The resultant inflationary or deflationary ratio would then be applied to the original values for all assets within that class. IPART believes that the regulatory asset base should represent shareholders financial investment in the utility and that the regulatory asset base be indexed using CPI. This is consistent with an approach used in most regulatory environments.

ABS publishes a number of different indices. The *All Groups CPI - Average of Eight Capital Cities* is considered the appropriate measure of inflation across the broader economy and should be adopted in undertaking Roll Forward assessments.

However the accuracy of relying on a Roll Forward approach is limited in its application where changes in market conditions occur.

Changes in technology, ownership structure, network configuration and the effects of competition within a regulatory period often warrant a revaluation of the asset base in order to reflect the market conditions prevailing at the time of the valuation.

Consideration should also be given to assumptions made in assessing previously determined asset values to test the appropriateness of using a Roll Forward approach. For example, changes in network utilisation and the level of optimisation applied in prior valuations may require a re-optimisation of the assets and should be considered by the valuer.

1.7 Regulatory Period

The code under clause 6.10.5 (c) requires that the regulatory period for distribution businesses to be no less than three years. However, all Electricity Business Network assets should be revalued for regulatory pricing purposes at least every five years. This would ensure that any likely changes within the marketplace are thoroughly examined.

2 Optimised Depreciated Replacement Cost (ODRC)

2.1 Conceptual Framework

The ODRC is calculated based on the gross current replacement cost (GCRC) of modern equivalent assets, that are adjusted for over-design, over-capacity and/or redundant assets, less an allowance for depreciation.

The ODRC valuation approach is used to determine a hypothetical value of the assets. This hypothetical value is a surrogate for market value in circumstances where it is not possible to determine values for specialised assets using a market comparison approach.

It follows therefore that the valuation approach should seek to reflect market behaviour, or put another way, the application of the approach should seek to replicate the thought process that would be followed by an informed potential purchaser acting without compulsion.

Where market evidence is readily available it is possible to establish a relationship between market value and replacement cost. Where market evidence is available for the same broad asset at varying ages, it becomes possible to establish a loss in value or depreciation profile. By its very nature, such a profile takes into account supply/demand characteristics and the impact of all other factors on value.

Conversely, in the absence of suitable market data, the valuer should seek to construct a loss in value or depreciation profile by measuring by other means, the various factors that impact on value.

In respect of the optimisation part of this measurement process, the valuer attempts to assess value by reference to the concept of substitution. It is logical to assume that the maximum amount a potential purchaser would be prepared to pay for an asset is represented by the purchaser's lowest alternative cost to replicate the asset. In assessing what represents the lowest alternative cost, consideration must be given to the optimum set of assets that would be required to provide the reasonably foreseeable services required to be delivered by the assets.

If the existing asset does not represent the lowest cost alternative asset to provide the reasonably foreseeable services, then the potential purchaser will adopt the replacement cost of the lowest cost alternative in place of the reproduction cost of the existing asset.

The ODRC of electricity transmission and distribution assets has been described as representing the minimum cost of replacing or replicating the service potential embodied in the network with modern equivalent assets in the most efficient way possible from an engineering perspective, given the service requirements, the age and condition of the existing assets and replacement in the normal course of business.

This concept is consistent with the principles of fairness and equity required in assessing access charges in that users only pay for those assets that are required in a commercial context and therefore are not required to pay for any excess capacity or over-engineering embodied in the existing assets.

As outlined above, the ODRC approach involves three main steps:

1. Establishing the Gross Current Replacement Cost (GCRC) of the gross service potential embodied in the existing assets by reference to modern equivalent assets

2. Adjusting the gross current replacement cost determined above for over-design, over-capacity and redundant assets.

3. Depreciating this value to reflect the anticipated effective working life of the asset from new, the age of the asset and the estimated residual value at the end of the asset's working life.

2.2 Establishment of Gross Current Replacement Cost

The GCRC is based on modern equivalent assets and is determined by reference to the current market buying price, current reproduction cost or replacement cost of modern equivalent assets.

In respect of specialised assets, such as most network infrastructure, the appropriate cost is the lower of the current replacement cost and the current reproduction cost of the gross service potential of the existing asset.

The GCRC can be established:

- By comparison with recent costs of similar assets;
- By reference to historical costs, adjusted for inflationary increases since construction;
- By contacting suppliers, manufacturers or their agents; or
- By reference to recently published prices.

2.2.1 Modern Equivalent Asset

Guidance in determining replacement costs is provided in Statement of Accounting Practice SAP1 "Current Cost Accounting". These Guidelines adopt SAP1 only in relation to the measurement of physical non-current assets. SAP1 states that the replacement cost to be used is the "lowest cost per unit at which the gross service potential could be obtained in the normal course of business".

GCRC of a modern equivalent asset is defined as:

> "The minimum that it would cost, in the normal course of business, to replace the existing asset with a technologically modern equivalent new asset with the same service potential, allowing for any differences in the quantity and quality of output and in operating costs".

The statement above requires the valuer to measure the gross service potential of an existing asset by reference to its modern equivalent asset. Reference to the modern equivalent asset is only made so as to obtain a current replacement cost for the asset already held, regardless of whether the modern equivalent asset will ever be purchased, or whether the existing assets will ever be replaced.

Further SAP 1, states:

"In determining current cost with reference to the most appropriate modern facility the capacity of that facility should not be such as would exceed materially … the scale of the entity's existing operations. The modern facility should be of commercially available technology and should not require a redesign or re-engineering of an entity's existing plant ".

2.2.2 Expected Capacity in Use

The replacement costs of individual assets should be based on the "expected capacity in use" of the existing assets. "Expected capacity in use" is the required level of service potential or output consistent with both the future growth in demand and the objective of minimising the whole of life cost of assets under 'total asset management' concepts and business planning horizons. As systems expand and change a degree of suboptimality at any one time is inevitable and is part of the total cost of output.

Where the modern equivalent asset has a different capacity, a pro-rata adjustment is necessary to value the expected capacity in use of the existing asset.

This determination of the modern equivalent asset that would replace existing individual components of the network should not be confused with the process of optimisation.

2.2.3 Cost Basis

Current costs can be determined on a 'Greenfields' or 'Brownfields' basis. The 'Greenfields' cost basis assumes construction occurs in an area free of development. The 'Brownfields' cost basis assumes construction occurs around all existing infrastructure and development.

The 'Brownfields' cost basis is considered appropriate because it is consistent with the concept of establishing the potential purchaser's lowest alternative cost to replicate the network (ie a duplicate network would need to be built in the existing environment). The current cost estimates should reflect the current state of land use development.

The 'Brownfields' cost structure is widely used for ODRC valuations including electricity, gas and water infrastructure assets in most states.

2.2.4 Direct Costs

The direct costs applied include any applicable indirect taxes in accordance with current tax legislation. The Goods and Services Tax (GST) is to be excluded from the valuation.

2.2.5 Indirect Costs

Due allowance must be made for indirect costs associated with the acquisition and/or creation of the asset such as on-costs, design and engineering costs, freight, duty, local delivery, interest during construction, etc.

The principles detailed in Australian Accounting Standard AAS11 "Accounting for Construction Contracts" identify the direct and indirect costs attributable to network assets.

2.3 Optimised Replacement Cost Adjustments

Because the ODRC of the network assets is based on determining the value of the service potential embodied in the assets, it is necessary to adjust the gross replacement cost of the existing assets for overdesign, overcapacity and redundant assets.

IPART states that *"an optimised system is a reconfigured system using modern technology designed to serve the current load with current technology, with some allowances for growth. This method excludes any unused or under utilised assets and allows for potential cost savings that may have resulted from technological improvement."*[3]

Therefore, when adopting the ODRC approach the valuer must establish whether the asset in its current form represents the optimum replacement given technological and functional changes since construction. By way of example optimisation may be required in situations where:

- the existing asset has a greater capacity than is required for existing and reasonably foreseeable use;
- the capacity or service potential embodied in the existing asset could be replaced more cheaply than the cost of reproduction of the existing asset due to improvements in construction techniques, economies of scale, etc.

In assessing the level of optimisation, it is important to recognise that it is not intended that a complete redesign or "greenfields optimisation" of the network be undertaken. Instead "incremental optimisation" is adopted, which allows progressive optimisation to the extent that it occurs in the normal course of business.

Incremental optimisation places a limiting constraint on the extent of optimisation. It denies a valuation based on optimal replacement of an entity's entire asset network. This latter approach is known as "greenfields optimisation".

The incremental ODRC approach recognises that there is always some degree of suboptimality and allowance for growth in future demand, and it reflects the historical development of the existing business, the time lag in asset planning and construction, the very long lives of the assets, and the replacement of its components, in the normal course of business. As systems expand and change, a degree of suboptimality at any point of time is inevitable and is part of the total cost of output.

The issue of re-designing the complete network layout is not considered appropriate for ODRC valuations of infrastructure. This is consistent with ODRC valuations undertaken for regulatory pricing purposes in respect of the gas transmission and distribution networks in South Australia and the electricity transmission and distribution networks in Victoria and Queensland.

2.3.1 Identifying Over-Capacity

The optimisation should be based on the reasonably expected level of use of the asset. The reasonably expected level of use will be determined by reference to the required level of service potential or output consistent with both the reasonably foreseeable future demand and the objective of minimising the whole of life costs of assets.

Whilst reliably projecting load growth has its own problems, the issue of what represents a reasonable timeframe is also problematic. This is because both elements have a degree of subjectivity in their determination.

[3] IPART, Aspects of the NSW Rail Access Regime, Draft Report, February 1999

Given the fact that many infrastructure assets are long lived and have a high capital cost, adopting an artificially short timeframe can have a distorting effect on the valuation. Furthermore the incremental cost of providing additional capacity at initial construction rather than on an incremental basis in response to actual demand growth often makes good commercial sense when considered over the longer term.

The NEMMCO Statement of Opportunities (SOO) provides guidance to what represents reasonably foreseeable levels of use based on committed developments and load growth projections.

The SOO includes a wide range of data and information relevant to the NEM, including:

- Forecasts of electrical energy usage and peak demands;
- Forecasts of electrical generator capabilities and other means of providing supplies to meet electrical energy demands;
- NEMMCO's assessment of the adequacy of the energy supplies to meet demand, referred to as the supply/demand balance;
- Forecasts of the inter-regional transmission network capabilities that reflect the ability of the network to exchange energy between regions of the NEM;
- Forecasts of ancillary service requirements that are necessary to ensure the secure operation of the power system; and
- A brief summary of some significant initiatives and projects that are expected.

The forecasts presented in the SOO span ten years.

2.3.2 Identifying Over-Engineering

One of the key features to consider in respect of whether a distribution network is over-engineered is the required reliability and security of the power system supplies.

NECA, in accordance with the requirements of the Code, established a Reliability Panel, which has determined a uniform reliability standard to be applied to the NEM.

The reliability of supply in a power system is a measure of its ability to survive a contingency (such as the failure of a generator) without interrupting supply to customers. Power system supply reliability is therefore related to the amount of spare or reserve capacity available to cover contingencies and the probability of contingencies occurring.

The required level of service for distribution networks is defined in terms of currently accepted service standards in the electricity supply industry in Australia and countries with similar conditions.

2.3.3 Over-Designed, Excess Capacity, Redundant and Standby Assets

Where assets are over designed, have excess capacity, or are redundant, then an adjustment needs to be made to the valuation. The adjustment is made so the resulting valuation reflects the cost of replacing the existing service potential of the assets based on an efficient set of modern equivalent assets to achieve the required level of service output ("capacity in use") within the entity's planning horizon.

Overcapacity or redundant assets may be defined as assets with a greater service capacity than is necessary to meet the service delivery outputs within the entity's business and total asset management planning horizon.

Severable components of an integrated network that are redundant should be regarded as surplus assets and excluded from the valuation. Non-severable components, which are redundant or represent overcapacity, should also be excluded from the valuation.

Overdesigned assets are assets with features unnecessary for the goods or services the assets provide. Measuring the service potential embodied in these assets, based on modern equivalent assets, automatically excludes attributing any value to the overdesigned features.

Standby assets are assets kept as back up to an operating asset in the normal course of business to minimise disruption of production when prime assets are temporarily out of service. As such, they are an integral part of the operating asset and should be valued in the same way as other assets subject to service and quality standards.

2.4 Determining the Optimised Depreciated Replacement Cost of Assets

2.4.1 Introduction

The optimised gross replacement cost of an asset must be depreciated where the existing asset's remaining useful life is less than the life of a new asset. Depreciation recognises the limited remaining useful life of an asset.

2.4.2 Principle in Determining Depreciation

Depreciation is used as a tool to measure the impact of the various forms of obsolescence on value. Straight-line depreciation can be used to measure the impact of physical obsolescence (the consumption of service potential). Other methods can be used to determine the impact of other forms of obsolescence as discussed below.

Current accounting standards provide guidelines for the depreciation of all non-current physical assets with limited useful lives. Australian Accounting Standard AAS4 "Depreciation of Non-Current Assets", and Statement of Accounting Practice SAP1 define useful life as "the estimated total period, from the date of acquisition, over which the service potential of the asset is expected to be used up in the business of the entity".

As such, it is the period before it becomes necessary for safety, economic, or technical reasons to replace or fully refurbish an asset. The impact of technology may subsequently lead to changes in useful lives and therefore, from time to time, remaining useful lives need to be reassessed.

Normally, useful lives may be determined on a time or use basis, and there are a number of methods for the calculation of depreciation including straight line, reducing balance and production units methods. These Guidelines require Network Businesses to use the straight-line depreciation method to ensure consistency of valuation.

2.4.3 Establishment of Effective Lives

The effective working life of an asset is its estimated life, assuming continued use in its present function as part of a continuing business. It is considered to be at an end when profitability is exceeded by operating and maintenance costs.

The standard and frequency of maintenance is a significant factor in the determination of effective lives. All other things being equal, a regularly and well-maintained asset will have a longer effective life than an identical asset, which is subjected to poor and infrequent maintenance.

Some of the factors, which must be considered when assessing effective lives, are:

- service utility of the assets;
- maintenance levels implemented by the owner or operator;
- the environment in which the assets reside;
- external factors such as supply/demand characteristics, changes in legislation, etc;
- physical, technological, functional and economic obsolescence.

In addition to these generic factors that impact on effective lives, assets of the same type within a network may have different lives due to different service conditions. Such factors might include:

- Environmental conditions;
- Level of use;
- Level of maintenance.

2.4.4 Residual Values

The residual value of an asset must be estimated to perform a depreciation calculation. This residual value reflects the fact that the asset may no longer be an economic proposition in its present role, however, it may remain in use but with profitability impaired due to increased maintenance costs and lack of efficiency compared with more modern assets. Alternatively it may be possible to sell the assets to a secondary user or for salvage value.

In principle when an asset reaches the end of its category or class life it has zero value under the straight-line depreciation method. Assets however remain in service beyond this period. It is reasonable to allocate a value to these assets in order to recognise their value to the network. A minimum remaining life can be applied to assets still in use that have exceeded the effective life ascribed to the relevant asset category or class.

The minimum remaining life is often referred to as “residual life” of the asset.

The concept of residual life recognises that effective lives are an average. Some assets will last longer while others will provide less service life.

In circumstances where an asset will be retired before the end of the effective life for its category or class, a life consistent with the planned retirement date should be adopted.

Where assets exceed the effective life, the principle involves marking time at a value, which will allow the asset to reach a zero value at the point of final retirement.

This is consistent with the concept of a residual value, commonly incorporated into the depreciated replacement cost approach. The approach recognises not only the potential scrap value or salvage value, but also the potential for a residual life (perhaps in some sort of down-graded or restricted role) beyond the effective life for that category or class of asset.

In principle, depreciation charges should cease on assets, which have reached the end of their total useful life. However, in initially establishing the asset register, it is realistic to allow for a minimum remaining life for all assets still in use, irrespective of age, for the purposes of the valuation. DNSP should allow a minimum remaining life for all assets still in use unless it is known that replacement or retirement will occur sooner.

The minimum residual life should not exceed the regulatory period of electricity pricing determination. Currently the period is five years.

2.4.5 Obsolescence

There are four forms of obsolescence that can impact upon the value of an asset. They are:

- Physical
- Technological
- Functional
- Economic

Infrastructure assets are often considered to be less susceptible to the last three forms of obsolescence than other assets, however in reality, at some stage in an asset’s life these forces can and do impact on value.

Physical obsolescence measures the consumption of service potential. It can be measured by using straight-line depreciation, that is, life consumed over total life.

Technological obsolescence results from changes in the design and materials of construction of currently available assets. As manufacturing techniques, materials and processes improve; manufacturers are able to construct assets with equivalent or improved output at lower cost levels. This form of obsolescence is particularly apparent in new or emerging technologies.

Improvements in technology and construction techniques commonly impact on infrastructure assets, especially because they are often long-lived. Normally infrastructure assets experience organic growth that matches the growth of a community over time. Assets are often built to a size that matches the needs of the community at the time. As the community grows the asset becomes outgrown by the needs of the community it serves. Additional assets are created that meet those additional needs. When viewed from the standpoint of current needs, the composite group of assets can often represent an inefficient set of assets for the task at hand.

Functional obsolescence also results from changes in the design and materials of construction of currently available assets, however the impact on value is measured by reference to changes in operating and maintenance costs rather than reductions in capital costs.

As discussed above, the size and/or capacity of a particular type of asset may have been constrained due to design and manufacturing techniques and materials of construction available at the time of construction. As these design and manufacturing techniques and materials of construction are developed and improved over time, it often becomes possible to create assets of a greater size and/or capacity than had been possible in the past. A small number of large assets usually attract lower operating and maintenance costs than a large number of small assets with an equivalent combined capacity or service potential.

Economic obsolescence results from external economic factors. It is defined as the impairment of desirability or useful life arising from economic forces, such as changes in optimum use, legislative enactments which restrict and impair the right to use the assets for their intended use, and changes in supply and demand relationships.

2.5 Materiality

Valuations are to be determined having regard to the principles of materiality as identified in Australian Accounting Standard AAS5 "Materiality" which defines materiality as follows:

"Materiality means, in relation to information, that information which if omitted, misstated or not disclosed has the potential to adversely affect decisions about the allocation of scarce resources made by users of the financial report or the discharge of accountability by the management or governing body of the entity".

Materiality in the context of valuations is generally considered to be of the order of ± 5% in gross asset value.

2.6 Goods and Services Tax (GST)

The Goods and Services Tax (GST) should be excluded from all regulatory asset base valuations.

3. Application Guidelines for DNSPs

3.1. Overview

These Application Guidelines provide the specific methodology to be followed by DNSPs in determining the ODRC values of their network assets.

The applications of the ODRC valuation methodology involves the following steps;

1. defining and identifying the network system assets;
2. assessing the replacement cost of those assets;
3. optimising the network configurations and its components asset and
4. determining the "optimised depreciated replacement cost (ODRC) value of the assets.

The ODRC is based on the engineering optimisation of the network configurations and its component assets following which an appropriate allowance is made for depreciation. It measures the minimum cost of replicating the system in the most efficient way possible, from an engineering perspective, given its service requirements and the age of the existing assets. The valuation is built up as the sum of the values of individual asset groups. The valuation should be based on an optimal network, built to modern efficient designs, that:

- meets the same service requirements as the existing network; and
- is depreciated to the same remaining life as the existing network

3.2 Defining and Identifying Network System Assets

The first step in determining the valuation of network system assets is to determine the quantities of the assets (lines, substations etc).

3.2.1 Boundaries for Identifying Network Assets

For the purpose of the Guidelines, network assets exclude those assets used for the generation of electricity.

Within New South Wales the DNSPs operate subtransmission and distribution networks generally at voltages of 132kV or less and are responsible for the delivery of energy to the majority of customers as well as the connection of any embedded generators.

For the purpose of the Guidelines, DNSPs are to exclude any Retail, Generation, or Ancillary business assets not forming part of their network activities.

For the purpose of determining the interface with generation plant, the high voltage terminals of the generating unit transformer are considered to be the point at which energy enters the network. Any equipment between the point of entry and portions of the network shared with others is considered as dedicated generator entry equipment.

For the purpose of determining the interface with customer equipment, the connection to the customer's assets or customer's premises is considered to be the point at which power exits from the network. Equipment beyond this point is considered as dedicated customer connection equipment.

The boundary between TransGrid and the DNSPs is to be determined in accordance with the ownership of the assets.

3.2.2 Types of Network Assets

The principal network assets of an DNSP are the network of power lines, transformers, associated switchgear and ancillary items linking customers to the points of supply where the DNSP takes delivery of the electricity. The system assets include control and communications systems and emergency spares. Depots, motor vehicles, office buildings, furniture and equipment, information technology systems for asset control, tools, plant, machinery and inventories are non-system assets. Valuation of non-system assets is dealt with in section 4 of the Guidelines.

Network assets are classified according to the function that they perform as follows:

- **Connection Assets -** those assets which serve a network user or group of network users at a connection point. These are either generator entry assets or customer connection assets. At exits, the following assets shall be treated as network assets where they are the property of the DNSP - service fuses, service connections, meters and load control relays.

- **Meshed EHV Network -** comprising systems operating at voltages of 220 kV and above plus any supporting systems at voltages between 66 kV and 132 kV. Such assets in New South Wales are mainly owned by TransGrid with the exception of some 132 kV assets owned by distributors that form part of the meshed network. TransGrid provides bulk supply to distributors usually at 132 kV.

- **Subtransmission Networks -** comprising systems operating at voltages of 33 kV to 132 kV, except for those assets supporting the meshed EHV network.

  Some large customers are supplied directly from transmission and subtransmission systems and embedded generators may be connected to these systems.

  In some cases a voltage step is omitted, eg with 132/11 kV transformation, where load densities are sufficient to make this economic.

- **High Voltage Distribution Networks** - operating at 22 or 11 kV or possibly 33 kV and distributing power throughout the area supplied. Many large customers take direct supply at this level.

- **Distribution Substations and Transformers -** erected on poles or ground mounted, installed along the lines to break the voltage down for reticulation at Low Voltage. Some distribution substations are installed in or on customers' premises and in these cases the transformers and other items of equipment may be owned by the customer.

- **Low Voltage Distribution Networks -** operating at 415/240V and providing supply to the great majority of customers.

- **Public Lighting Assets -** may include street lighting where owned by the DNSP.
- **Ancillary Equipment -** forming part of the network or its operating hardware. These include system control facilities, communications equipment and lines, substation buildings and rights of way (easements).
- **Emergency Spares**

Network owners are to be responsible for determining the elements of their system that fall into these categories.

3.2.3 Minimum Classifications

As a minimum, it is recommended that the fixed asset registers of DNSPs include the following classifications:

- Generating Station Switchyards
- Subtransmission Lines (by voltage and if considered necessary by conductor size)
- Subtransmission Cables (by voltage and if considered necessary by conductor size)
- Zone Substations
- Power Transformers
- Distribution Mains HV Cables and Lines (by voltage and if considered necessary by conductor size)
- Distribution Substations (pole mounted, ground mounted, indoor, customer)
- Distribution Transformers (by size)
- Distribution (Mains) LV lines (overhead and underbuilt; subgroups could also be established on the basis of conductor size)
- Distribution (Mains) LV cables (subgroups could be established on the basis of conductor size)
- Distribution Switchgear (by type)
- Public Lighting Assets
- Customer meters and load control devices (can be divided into subgroups on the basis of customer type, eg domestic, light commercial and industrial, heavy commercial and industrial)
- System control facilities (SCADA)
- Communications facilities (terminals, lines)
- Land (associated with substations)
- Easements or other rights-of-way
- Emergency Spares.

3.2.4 Asset Groups

Network assets can be grouped for costing purposes. Proposed groups and subgroups are set out in Appendix B to these Guidelines.

3.2.5 Minimum Data Requirement

To conduct an accurate and valid valuation it is considered the following are the minimum data requirements.

- Asset register database. There may be more than one database to cover different asset types. There should be verifiable processes used to populate and keep the database up to date.
- The asset register database should contain as a minimum the asset categories outlined in this Guideline and sufficient attributes and other data available to value and assign residual lives.
- The minimum attributes classification of assets necessary for valuations are material types, sizes, quantities, year constructed/refurbished and condition.
- External attributes impacting on construction and asset performance should also be recorded. They are typically ground type, development density, failure histories and operating environment.

3.2.6 Data Verification

To ensure the information available in the database is accurate and complete, records should be verified by sampling.

The key components of the verification process should include:

- Verification of asset records for location and length.
- Completeness of records in relation to timing of assets being added or removed.
- Assessment of construction date and capitalised rehabilitation.

The number of samples is usually selected so as to provide analysis results with 95% confidence. The significance of items should also be considered in terms of its effect on accuracy and materiality of the overall valuation.

3.3 Assessing the Replacement Cost of Network System Assets

The second step in determining the ODRC of network system assets is to ascertain the replacement cost of the identified assets, not on the basis of the particular assets installed, but on the basis of replacement with modern equivalent assets.

The following Guidelines on standard replacement costs are provided to achieve a consistent and cost efficient approach to valuation.

3.3.1 Standard Costs

Each of the asset groups and subgroups should be allocated a per unit replacement cost for its modern equivalent.

Since cost efficiency and consistency of valuation between DNSPs is an important objective, it is appropriate that a common set of standard costs be applied by all DNSPs. The standard costs that should be applied in the valuations are set out in Appendix C to these Guidelines. Appendix C also includes explanatory notes on how the standard costs should be used. The standard costs should be applied unless there is good reason to do otherwise. Justifications for all departures from the standard costs should be documented with a clear audit trail.

3.3.2 Non Standard Costs

The standard costs do not cover every type of construction and site condition, but their use should allow the majority of the assets to be assessed. Appendix C provides guidance on how costs should be determined for those assets for which no standard costs are given.

3.3.3 Variation of Costs

There may be considerable variation in the unit costs of lines depending on the region, general topography, diversity of development and accessibility. The costing methodology outlined in Appendix C indicates how to make allowance for such variations.

3.3.4 Valuation of Land and Easements

Land and easements are is to be valued in accordance with Section 5 of these Guidelines.

3.4 Optimisation the Network Configuration and its Component Assets

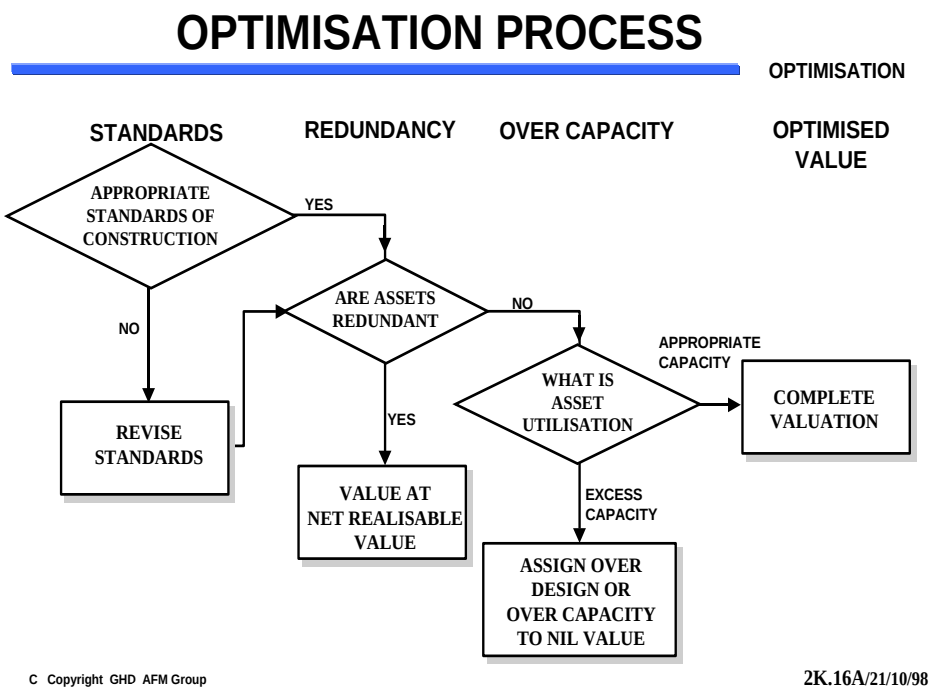
3.4.1 Introduction

The third step in determining the ORDC Valuation is to undertake an optimisation of the network configurations and its components asset to enable the optimised replacement cost value (ORC) of the network system assets to be derived. The purpose is to ensure the valuation reflects the replacement costs of an efficient set of modern equivalent assets able to achieve the required level of service.

An “incremental optimisation” approach is to be followed in which the existing network is examined and changes made to ratings, configurations, designs or materials to optimise the network configuration and its component assets having regard to such issues as excess capacity, redundancy and over-design.

The optimisation for purpose of ODRC valuation is not concerned with improving the system from its current state. Optimisation cannot result in an increased network system asset replacement cost.

The steps in the optimisation process are shown in the following diagram.



Guidance regarding the optimisation process, it's standards, constraints and scope follows in this section.

3.4.2 Optimisation Principles

The capacity of a subtransmission and distribution networks may depend on thermal, voltage and stability considerations. Individual network elements cannot be considered in isolation from each other. A rigorous review of optimisation of the network therefore requires detailed computer analysis of the network and knowledge of the operational difficulties applicable to the system. Optimisation studies are usually performed by the asset owner and subsequently reviewed by the valuer.

The optimisation should be based on the reasonably expected level of use of the asset, which is determined by reference to the required level of service potential or output consistent with both the reasonably foreseeable future demand and the objective of minimising the whole of life costs.

The optimisation should also be based on the required reliability and security of the power system supplies.

The optimisation should assume the following constraints:

- The location of generating plants and points of bulk supply should be assumed as fixed.
- The location of customers should not be varied.
- The existing boundaries of other network businesses should not be varied.
- Only existing easements, line and cable routes should be assumed.
- The optimised network should have an import/export capacity similar to that of the existing system.

- The optimised system should have inherent stability, reactive power support and fault level ratings sufficient for the business planning and Total Asset Management planning period but not more than the existing system.

The required level of service for distribution networks will be defined in terms of currently accepted service standards in the electricity supply industry in Australia and countries with similar conditions. The level of services include:

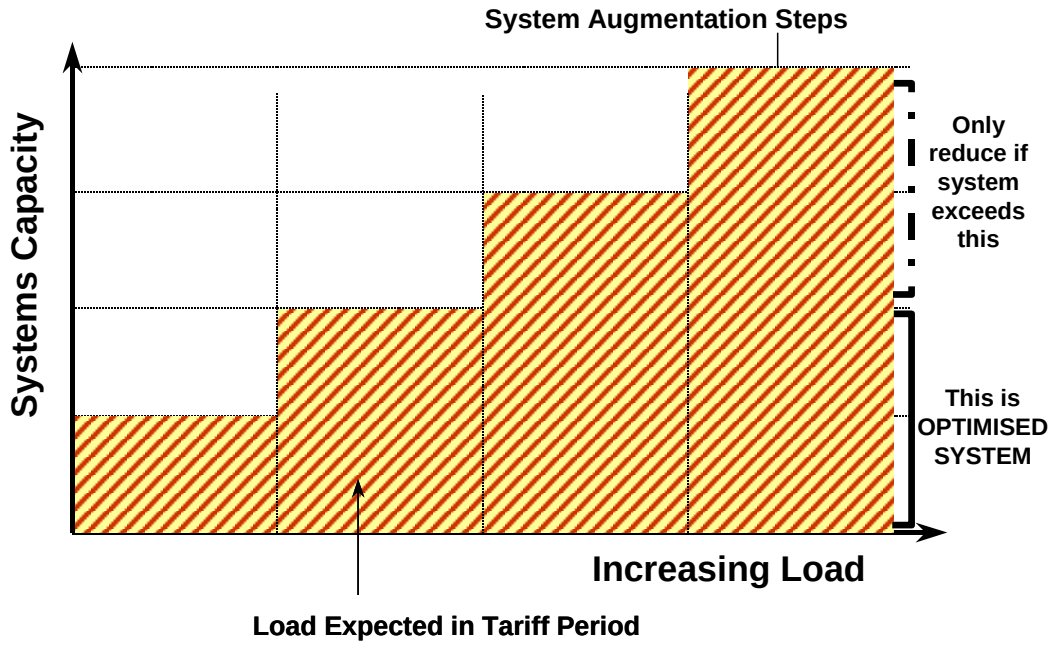
- acceptable reliability of supply based on industry accepted indices for proportions of customers subject to interruptions, the number and duration of outages and types of customers affected
- safety requirements where these influence the choice of materials or type of construction
- voltage stability and other quality of supply issues
- degree of security of supply considered appropriate in different circumstance such as urban and rural, residential and industrial. This is assessed by reference to the level of in-built redundancy such as n, n-1, n-2 etc

In assessing the levels of optimisation consideration needs to be given to efficiencies undertaken by the DNSP such as:

- the economic value placed on electrical losses
- least cost considerations, taking into account operating and maintenance costs as well as capital costs
- the cost of demand not served
- energy not supplied

System designs, particularly those related to long lead times, are usually completed in steps in anticipation of load forecasts. The design follows the system augmentation steps, usually with a long planning horizon of 10 years. Optimisation should be based on the 'excess capacity' available through over design, i.e. 'the excess augmentation steps'. This is illustrated in the following diagram.

Asset Optimisation



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Optimisation should be based on the asset configuration and size necessary to meet the load predicted in the tariff period or the 'planning horizon' necessary for that asset type having regard to the largest predicted load.

The planning horizons for the network components are:

Components	Planning Period (years)
Transmission and Sub-transmission	15
Zone Substations	10
Power Transformers	10
Distribution and Low Voltage	5
Tariff Period	Currently 5

3.4.3 Optimisation Network Configurations and Assets

The following criteria are to be applied to determine the optimisation to be applied for the ODRC valuation. The overriding criterion is that the optimised system cannot be better than the system in place.

3.4.3.1 Zone Substations

Each zone substation is to be examined for optimisation:

- Reliability criteria

This will be based on the requirements to meet reliability criteria within the normally accepted definitions of:

n loss of equipment will result in loss of supply for an acceptable period

n-1 loss of one piece of equipment will not result in interruption to supply.

- Redundancy

  Any zone substations considered redundant should be excluded.

- Transformer capacity

  Based on the accepted planning horizon, supportable load growth projections, voltage stability, fault levels, reliability criteria and cyclic ratings, each transformer shall be examined for suitable rating.

  Where the existing rating exceeds the predicted rating, the transformer shall be optimised down to the nearest modern equivalent standard rating.

  As a guide, the projected maximum demand on each zone substation at the end of the chosen planning period should not be less than 85% of the firm capacity of the substation.

- Spare equipment

  Any spare equipment such as circuit breakers shall be optimised out where they will not be required in the accepted planning horizon.

- Configuration

  Any bus configuration that is above the required reliability criteria shall be optimised to an applicable configuration eg a double bus selectable configuration originally built for n-1 criteria that no longer applies would be optimised to single bus configuration.

  Any equipment that becomes redundant due to sub transmission line/cable optimisation shall be excluded.

- Buildings

  Optimise if over-designed for the application. In assessing the over-design, take into account that community expectations and local regulations often require the buildings to be designed to fit into the surrounding environment, resulting in physical configurations that may not be the optimum engineering design.

3.4.3.2 Subtransmission Lines and Cables

Using the maximum demand growth projections, planning horizon, fault level and thermal ratings as well as considering reliability criteria and voltage performance/stability, the conductor shall be optimised to the nearest rating standard size that is suitable for the optimised rating.

Where a line has been built to a higher voltage configuration but energised at a lower voltage it shall be optimised to the lower voltage if the higher voltage will not be needed in the accepted planning horizon. Any circuits considered unnecessary should be excluded.

3.4.3.3 Distribution Transformers

The method of optimisation will depend on the availability of data within the DNSP.

Method 1 – Where there is insufficient data on customers and transformers

The total installed distribution transformer capacity should be optimised down if considered excessive. As a guide, the aggregated utilisation of distribution transformers expressed as system maximum demand in MVA (excluding the demand of HV customers) divided by total installed distribution transformer capacity in MVA should not be less than 50% in urban areas and 30% in rural areas.

Method 2 – Where there is sufficient data on customers and transformers

This method recognises that the overall system diversity, used in method 1, is not the most appropriate factor to be included in the distribution transformer optimisation process. Diversity increases as the load is aggregated, that is, the lowest diversity occurs at the LV customer service. Maximum diversity occurs at the transmission network point of connection. The diversity at the distribution transformer level is closer to the customer connection point than that at the network connection point.

The following transformer groups also distort the overall diversity as they are for one off customers and reflect minimum economic sizing. They should be removed from any calculations and not optimised:

- minimum economic size eg 16 kVA single phase pole transformers for single rural customers
- transformers with one or a small number of customers where the rating is required for maximum demand eg irrigation pumps required only for a small number of months in a year.

Due to different load factors and utilisation it is appropriate to optimise on separate energy utilisation targets for urban and rural distribution transformers. Energy utilisation of the DNSP is determined by the following formula and compared with the targets as determined by their system parameters. When optimising using this method the DNSP shall justify their targets. Where the utilisation does not meet the targets, the number of distribution transformers should be optimised down. This would typically be done on a $/kVA basis.

$$\text{Energy Utilisation} = \frac{\text{LV Customers Annual (in MWh)}}{\text{Installed Dist Transformer Capacity (in MVA)} * 8760}$$

In order to determine the appropriate energy utilisation targets for an DNSP the following needs to be calculated. The targets are dependent on the after diversity maximum demand (ADMD) used by the DNSP, controllable loads, customer annual consumption and distribution transformer utilisation. Typically these factors would be:

- ADMD would be in the range 2.5kVA to 6kVA (with changes in peoples use of electricity higher ADMD's are becoming commonplace).
- Transformer utilisation of 70 - 80% for urban transformers and 50 - 60% for rural transformers.

- Controllable loads such as hot water should not be included in calculations of diversified load factor as they are run at off peak times.

By way of an example for an urban ADMD of 3.5kVA, customer annual consumption (excluding controllable hot water) of 6000kWh at a 0.95 power factor and transformer utilisation of 80%, the Energy Utilisation target would be 16.5%. This is calculated from

$$\text{Diversified Load Factor} = \frac{\text{Annual consumption (in kWh)}}{\text{ADMD (in kVA)} * \text{pf} * 8760}$$

Energy utilisation target = Diversified Load factor * transformer utilisation

3.4.4 Distribution Feeders

Ideally distribution feeders would be optimised on an individual basis along similar lines to subtransmission feeders. As this is not practical due to the number of feeders and the operational requirements that can change loads on a frequent basis, optimisation is to be carried out on a sample basis. The framework for the optimisation is:

- DNSPs to stipulate the planning and design criteria for the distribution feeders, including planning horizon, voltage stability, fault levels, reliability criteria, switching criteria, losses, thermal ratings and current levels. These criteria are to be assessed for reasonableness.
- An audit of a sample of actual feeders based on the criteria in the above point. This would use loads projected to the planning horizon using known demand growth rates for the zone substation that the feeder is connected to.
- The factor of optimisation determined from the above process would be then applied to all the DNSP's distribution feeders.

3.4.5 Underground Reticulation

Underground reticulation is largely driven by community environmental expectations. As such local planning guidelines and prudent commercial operators reticulate systems underground. Any existing underground reticulation should be valued on the basis of replacement cost of underground assets. Valuing underground assets at the replacement cost of equivalent overhead reticulation should only be carried out where it can be clearly demonstrated that community standards would accept overhead assets.

Optimisation for ducts will need to take into account economic and outside body constraints e.g. Council requirements in City areas requiring installation of ducts ahead of the planning horizons nominated above.

3.4.6 Emergency Spares

An assessment should be made of emergency spares where these are material to the overall valuation. Those assets which are of inappropriate type, or which for whatever reason are unlikely to be used by the DNSP, should be optimised or written off.

3.5 Determining the Optimised Depreciated Replacement Cost Asset Value

The fourth step in determining the ODRC valuation is to depreciate the optimised replacement cost value of the network assets where the existing asset's remaining useful life is less than the useful life of a new asset. The depreciation recognises the limited remaining useful life of the asset.

3.5.1 Standard Effective Lives

Since cost efficiency and consistency of valuation between DNSP's is an important objective, it is appropriate that a set of standard asset effective lives be applied by all DNSP's. The standard effective lives which should be applied in the valuations are given in Appendix C to these Guidelines. They have been derived from industry experience including an ESAA Member Survey in 2000

These Guidelines are intended to provide reliable effective lives for the assets and as a general principle DNSPs are to use the lives given in Appendix C. However there will always be exceptions. Even identical infrastructure assets decay at different rates and these figures represent an appropriate mean. Some assets will decay at an accelerated rate due to one or more of the following impacts:

- Design faults
- Material faults
- Manufacturing or construction faults
- Inadequate maintenance
- Overstressed operations
- Operating environments
- Accidents or other events

In these instances, where evidence is available that the effective life will deviate significantly from the listed standard effective live, or a standard life does not exist in the schedule DNSPs can self assess and determine a more appropriate effective life (residual).

In some instances, assets will last significantly longer than the scheduled life because of the nature of the asset and it's operating environment.

There are 3 cases where self-assessment will apply:

1. A new technology asset that does not exist in the Guidelines schedule. In this instance, the DNSP will use manufacturer or other supportable data to establish an effective life for this asset type.

2. Existing assets that will have a predicted shorter life than scheduled e.g. early manufactured XLPE cable, which allowed water ingress. In this instance, the DNSP will continue to depreciate the asset in accordance with effective lives until the date of replacement. At this point this asset will be written off.

3. Existing assets that have a predicted longer life than the Guidelines schedule allows. In this instance, the DNSP will extend the effective life at the point of self-assessment and write the balance off over the residual life determined.

Cases 2 and 3 are illustrated in the following diagram. It should be noted that the diagram relates to the handling of asset life, not asset revaluation.

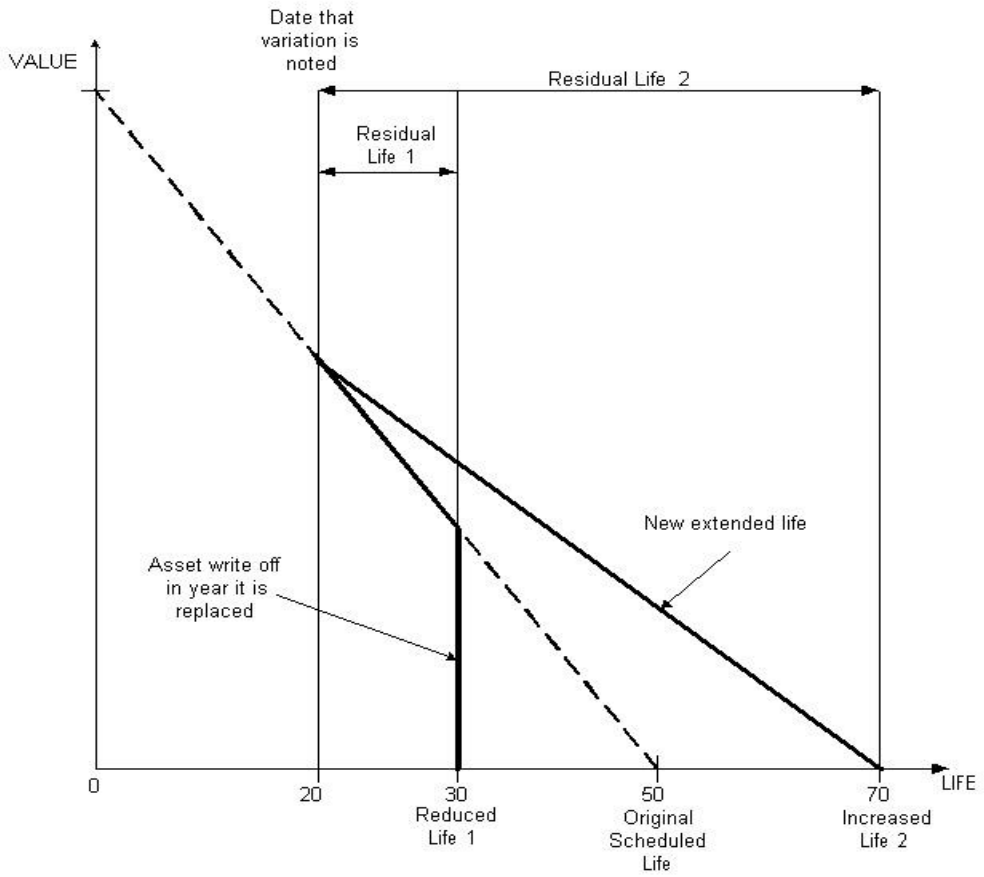

Diagram: Effect of Life Extension

In all instances the DNSPs need to qualify the basis of their claim and provide adequate information to support their self-assessment.

3.5.2 Determining Asset Remaining Useful Lives and Ages

The age of an asset should be the actual age taken from the asset register database or the best estimate thereof.

The remaining useful life of an asset should be either:

- the total useful life less the life expired to date (the age of the asset); or
- the best estimate of the time to expiry of the total useful life of the asset.

For the purpose of valuations prepared in accordance with these Guidelines, the first method referred to above is preferred.

Where an estimate of the remaining useful life of an asset or group of assets is made, it should be based on:

- the condition of the asset;
- any refurbishment work that has been carried out; and
- the level of past maintenance (from service records and the views of the DNSP's technical staff).

3.5.3 Determination of Ages

It may be difficult to establish the history of some assets, thus making it difficult to assign ages for depreciation purposes. It will be necessary to use whatever information the DNSP can provide including annual expenditures on some items. It may be necessary to carry out field surveys of the condition of selected assets to ensure that the input data is sufficient to produce reliable results.

3.5.4 Minimum Remaining Life

In principle, depreciation charges should cease on assets, which have reached the end of their total useful life. However, in establishing the ODRC valuation, it is realistic to allow for a minimum remaining life for all assets still in use, irrespective of age, for the purposes of the valuation. DNSPs should allow a minimum remaining life for all assets still in use, unless it is known that the asset will be retired or replaced earlier. The minimum residual life should not exceed the regulatory period of electricity pricing determination. Currently the period is five years.

Where a particular asset is expected to be retired early from service because it will become redundant as part of a development of the system, this should not be taken into account in assessing the remaining life of that asset but should be adjusted for as part of the valuation process. However, where a class of assets is routinely replaced as part of the evolution of the system before its technical life expires, then this should be taken into account in assessing the total useful life for that class of assets.

3.5.5 Depreciation of Group Assets

In some cases, it may be necessary to group assets for costing purposes. For example, distribution transformers may be grouped and described by the quantity of each kVA rating. They may be of varying ages.

Possible approaches in such cases are:

- An estimate could be made of the average age and therefore remaining life of the group of assets as a whole. The estimate could be based on a sample of records, annual statistics of new construction or other methods. The average should be weighted if the group includes assets with different replacement costs.
- The group could be completely disaggregated into individual assets each depreciated based on its known age.

The most appropriate method for dealing with groups of assets will depend on data availability, calculation complexity and the materiality of the group's value in relation to the value of the whole network. The method used will also be defensible in ensuring consistent life/age treatment in subsequent revaluations.

3.5.6 Depreciation Issues

- Where optimisation notionally replaces an existing asset with an optimised modem equivalent (eg of smaller rating), then the optimised asset should be depreciated as if it was the existing asset.
- Where a group of assets are notionally replaced with a group of reconfigured assets, the depreciation of the reconfigured assets is less straightforward. In these circumstances the reconfigured assets should be depreciated as a group to effect the same overall depreciation proportion (ie remaining life/total life) as the group of existing assets.

3.5.7 The Optimised Depreciated Replacement Cost Value

For straight-line depreciation, the optimised depreciated replacement cost value (ODRC) is:

ODRC = ORC * MAX (MRL, RUL)/TUL

Where:

ORC = Optimised Replacement Cost

MRL = Minimum Remaining Life

RUL = Remaining Useful Life

TUL = Total Useful Life

3.5.8 Residual Value

In rare situations, the issue of a residual value may arise. That is, at the end of its life, a class of assets may have a residual value. Where an asset has a disposal value that exceeds its worth then a negative value is to be included in the valuation. If the disposal value is less than the asset worth then this residual value is to be included in the valuation. The values to be assigned are to be determined by self assessment.

3.6 Independent Opinions

The ODRC valuation of each DNSP must be supported by independent opinions that the valuation complies with these Guidelines. The ODRC valuation is to be supported by the opinion of an independent engineer and/or qualified asset valuer who is, or is eligible to be, a corporate member of the Institution of Engineers of Australia and/or an associate or fellow to the Australian Property Institute (and accredited as a Certified Practicing Valuer in the appropriate valuation discipline).

The ODRC valuation is to be supported by the opinion of an independent accountant who is a registered company auditor, relying on the valuer's opinion of the ODRC valuation.

4 Non System Assets

4.1 Background

The framework to enable the consistent approach to the valuation of non-current assets is provided by various accepted accounting principles, standards and guidelines. The Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises sets out and provides the broad framework for the valuation of assets including non-system assets.

The existing framework established for the valuation of non-current assets for financial reporting has been used for the purposes of valuing non-system assets for regulatory pricing purposes.

In August 1994, the Steering Committee on National Performance Monitoring of Government Trading Enterprises (GTE) issued a comprehensive document on asset valuation entitled "Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises".

The GTE asset valuation policy adopts the view that the "value-to-the-entity" concept is the appropriate basis for measuring physical non-current assets at current values.

In the GTE policy document, the "value-to-the-entity" concept is translated into the concept of "deprival value" which is not a method of valuation but a guide to the bases of valuation, which should be adopted.

4.2 Accounting Standards

The GTE policy document also requires GTE's to produce financial statements in accordance with relevant legislation and to conform to accounting standards issued by the Australian Accounting Standards Board.

Where non-current assets are to be revalued for financial reporting purposes, the revaluations are to be accounted for in accordance with AAS38/AASB1041 "Revaluation of Non-Current Assets".

In the GTE policy document, the "value-to-the-entity" concept is translated into the concept of "deprival value". In principle the "value-to-the-entity" concept in accordance with AAS38/AASB1041 is translated to the definition of "Fair Value".

> Fair Value is defined as *"the amount for which an asset could be exchanged, or liability settled, between knowledgeable, willing parties in an arm's length transaction"* it further states *"…underlying the definition of "fair value" is a presumption that the entity is a going concern without any intention or need to liquidate the or wind up its operations…"*

The various valuation guidelines and accounting standards provide a broad framework for the valuation of non-current assets that may differ in definition, but provide similarity and consistency in methodology and approach.

The basic definition of Fair Value has been adopted consistent with that enunciated in the High Court decision of Spencer v Commonwealth of Australia (1907) 5 CLR148 in relation to the definition of Market Value.

Market Value is a fundamental valuation concept, which can be determined using a number of approaches, as explained earlier in the Guidelines, which may differ in use, depending upon the specialised nature of the assets being valued.

4.3 Specialised Assets and Non-Specialised Assets

In the application of the GTE policy guidelines, the non-system assets are to be listed and classified as either Non-Specialised Assets or Specialised Assets.

- Non-Specialised Assets are those assets that are not specific to the industry and would be readily acquired and disposed of in the ordinary course of business.
- Specialised Assets are those that exist for a purpose which is of particular advantage and may be unique to the industry, and/or those assets which are not normally traded in a secondary market place (except as part of a total entity by reason of their physical characteristics).

The valuation of Non Specialised Assets depends upon the manner in which the assets are acquired. The guidelines state that where assets are normally acquired in a secondary market, the price of a second-hand asset is relevant in determining the value. Where assets are not normally acquired in a secondary market, the price of a new asset (adjusted to take account of service potential and the impact of other obsolescence factors) is relevant in determining the value.

For specialised plant, as there is no trading market for such assets, the appropriate value based upon the guidelines is the lower of the current replacement cost and the current reproduction cost. This is consistent with the optimised depreciated replacement cost approach.

> AAS38/AASB1041 states "where there is no market evidence of the asset's market selling price, because the asset is specialised…..the asset's fair value is measured at its market buying price, the best indicator of which is the replacement cost of the asset's remaining future economic benefit…"

Having determined the appropriate classification and categorisation of the assets under the deprival value concept the following approaches should be adopted:

Categorisation	Valuation Approach
Non-Specialised	Market Comparison Approach or Income Approach
Specialised	Optimised Depreciated Replacement Cost Approach

4.4 Categorisation of Non-System Assets

Non-system assets can be categorised to include the following:

Passenger Vehicles
Commercial Vehicles
Office Buildings, Equipment and Furniture
Workshop Equipment
Electronic Test Equipment
Computer Hardware and Software
Storage and Warehousing Equipment
Maintenance Depot Buildings and Equipment

5 Valuation of Land and Easements

5.1 Land Valuation

Land that is held by an agency can be categorised as follows:

1. Land that will continue to be used by the agency for the foreseeable future in support of its business operations (Land in Use by the Agency).
2. Land that will continue to be used by the agency in support of its business operations for a limited term (Land with Limited Use to the Agency).
3. Land that is no longer required to support the agency's business operations (Surplus Land).

5.1.1 Land in Use by the Agency

Where land is held for continued use and would be replaced if the agency was deprived of it, the basis of valuation under the deprival value concept is the current market value for the existing use.

Where land is valued on the basis that it will continue to be used for the existing purpose, there are a number of inherent assumptions:

- The existing use of the land will continue to support the business operations thereon;
- The future service potential of the land will not diminish in the foreseeable future; and
- The business operated on the land is profitable and will continue to be profitable for the foreseeable future.

On the basis of the above criteria, there is no intention that the land would be made available for an alternate use, irrespective of whether an alternate use would provide a higher value.

5.1.2 Land with Limited Use to the Agency

Land with limited future service potential, that is, the existing use of the land will be discontinued in the relatively near future (say, the next five years) should be valued on the following basis:

- The present value of future net cash inflows for the remaining term of the existing use; and
- The deferred value of the alternate use of the land.

The present value of the future net cash inflows would only be assessed over the anticipated remaining life of the existing use. In those circumstances where cash inflows cannot be clearly identified from the land, then an appropriate yield should be assessed that reflects the continued use by the agency. The present value of the potential net income should then be determined for the remainder of the existing use. The alternate use value should be deferred until the existing use is discontinued. The sum of these two assessments would be the value of the land subject to a limited use requirement by the agency.

5.1.3 Surplus Land

Land that is surplus to the current or anticipated needs of an agency should be valued at current market value.

Irrespective of the category of the land holding outlined above, the valuation should take into account the nature of the parcel, the legal restrictions on use, the opportunities for and impediments to development that are inherent to the specific parcel of land, other constraints that exist in respect of that land and any other special attributes that the land may possess.

For the purpose of these guidelines, “land” includes buildings, site improvements and all interests in land.

5.2 Easement Valuation

Easement valuation is currently under review.

6 Capital Contributions

6.1 Background

Capital Contributions are payments made by customers to meet the costs of connecting the customers to the electricity network. The DNSPs require contributions from customers generally for two purposes:

- the costs of connecting the customer to the network; and
- the costs of upgrading or augmenting the existing network.

Capital Contributions are made in the form of cash and non-cash contributions. Generally non-cash contributions refer to contributions of the assets themselves which the customer has procured from an outside supplier, while cash contributions refer to the amounts charged by the entity for connection or augmentation works carried out by the entity itself in order to connect the customer.

An assessment of the current value of Capital Contributions is required in order to ensure the regulatory asset base excludes Capital Contributions and therefore charges to customers do not include a return on assets contributed by customers.

The issue of estimating the current written down value of capital contributions is driven by poor quality of records and information. Traditionally little or no details regarding cost, type or lives for individual capital contributed assets have been entered into the asset registers or records of the entities. Generally, the only historical records of capital contributions made are annual total amounts recorded within annual financial records.

The methodology proposed reflects the current situation and involves comparing and analysing the historical information available.

6.2 Methodology

6.2.1 Weighted Historical Percentage

The methodology involves the analysis of historical Capital Contributions and Capital Expenditure data from available annual accounts. This information is used to compare the Capital Contributed Assets as a weighted percentage of the historically recorded Capital Expenditure amounts.

The weighted percentage amount is applied to the ODRC valuation in order to provide an approximation of the value of the capital contributed component.

The application of the methodology involves the following steps:

- Establishing historical Capital Contribution and Capital Expenditure Amounts including cash and non-cash contributions.
- Correlating data into distinct time periods in order to apply weighted bands.
- Indexing historical amounts to reflect current replacement costs.
- Calculating sum totals of indexed amounts for each distinct time period.

- Calculating Capital Contribution as a percentage of Capital Expenditure.
- Calculating weighted average capital contributions as a percentage of Capital Expenditure, for all time periods.
- Applying Weighted Percentage factor to ODRC valuation amount.

Capital Contribution Example

Weighting Band – Years	1961 – 1979 (pre – amalgamation)	1980 – 1995 (post amalgamation)	1996 – 2000 (post corporatisation)
Years within Band	19	16	5
Total Indexed Capital Contribution (CC)	40,300,345	31,893,993	79,095,837
Total Indexed Capital Expenditure (Capex)	498,098,873	135,983,138	230,983,465
CC as a percentage of Capex	8.1%	23.5%	34.2%
Weighted Average Capital Contribution as a percentage of Capital Expenditure			17.5 %

ODRC Valuation: $1.5 Billion x 17.5%

Capital Contribution Amount $262 Million

6.2.2 Indexed Historical Cost

Capital Contribution assets comprise differing asset groups that vary in type and effective life. Using the indexed historical cost approach to arrive at current values is considered unreliable considering the type of data available and the difficulty involved in identifying the individual assets items.

The indexed Historical Cost approach involves the revaluation of the contributed amounts on a pooled historical cost basis against which inflation indices and nominal asset lives are applied.

The disadvantages of using the methodology include;

- The methodology involves the use of a single standard nominal life applied to assets with differing asset lives; and
- Indexing contributed amounts to present day values does not reflect the changes in the type of assets built since new, or the value of the modern equivalent assets.

6.2.3 Comment

As emphasised previously the level of accuracy possible in the valuation of Capital Contributions is limited by the lack of suitable information and data. The proposed methodology of analysing percentage factors is considered the more suitable approach in determining the proportion of contributed assets however it is recognised that the results may not be entirely accurate. The approach is adopted as a pragmatic solution because a more reliable method cannot be applied given the lack of reliable historical data.

Appendix A: Other Accounting Guidance

In applying the guidelines set out in this Paper, reference should also be made to other related NSW Treasury policy documents and accounting standards, particularly the following:

- NSW Treasury Technical Paper "Guidelines for Capitalisation of Expenditure in the NSW Public Sector" (January 1994).
- Steering Committee on National Performance Monitoring of Government Trading Enterprises, "Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises Using Current Valuation Methods" (October 1994).
- Statement of Accounting Concepts SAC4 "Definition and Recognition of the Elements of Financial Statements".
- Australian Accounting Standard AAS4 "Depreciation of Non-Current Assets".
- Australian Accounting Standard AAS5 "Materiality in Financial Statements".
- Australian Accounting Standard AAS10 "Accounting for the Revaluation of Non-Current Assets".
- Australian Accounting Standard AAS11 "Accounting for Construction Contracts".
- Australian Accounting Standard AAS21 "Accounting for the Acquisition of Assets (including Business Entities)".
- Australian Accounting Standard AAS38 "Revaluation of Non-Current Assets"
- Statement of Accounting Practice SAP1 "Current Cost Accounting".
- NSW Public Works Department, Total Asset Management Manual (October 1992)

Appendix B: Asset Types, Groups and Subgroups

B.1 Network assets can be grouped for costing purposes into types, groups, and subgroups. To make the valuation practical, the following groups and subgroups are suggested.

Lines and Substations

B.2 Groups and subgroups should be:

a. Subtransmission Lines

Subtransmission lines can be divided into subgroups by voltage; 132 kV, 66 kV and 33 kV.

Further subdivision should be by conductor size in cases where DNSP's have extensive networks with considerable variation.

Note that in this and all other asset categories, it is replacement modern equivalent assets that are to be quantified and costed, not the existing assets. The terrain over which the lines are constructed must be taken into account as it will affect the cost of replacement assets and, if considered necessary, the quantities in each category (lines in hilly terrain, lines in flat country, lines in urban areas) should be recorded separately for costing at different rates.

Easements should be treated separately.

For valuation purposes, the unit is one (1) km.

b. Subtransmission Cables

Subtransmission cables can be divided into subgroups by voltage; 132 kV, 66 kV and 33 kV

If cable sizes differ markedly within an DNSP, the quantities may need to be recorded separately for ranges of capacity as in a. above.

For valuation purposes, the unit is one (1) km.

c. Zone Substations

Subtransmission and zone substations can be divided into categories by capacity - CBD, Major, Medium and Small; and configuration – Indoor and Outdoor.

In most cases a zone substation can be divided into building blocks eg. feeder bay, transformer bay. Each bay being made up of components such as circuit breakers, CT's, VT's, isolators.

Quantities should be determined separately for:

i. Transformer bays

ii. HV feeder and bus section bays

iii. Distribution feeder and bus section bays

iv. Buildings

v. Other components

Land should be treated as property and valued separately.

Replacement costs should be based on cost-effective configurations.

Zone substations should be costed without power transformers.

For valuation purposes, the unit is one (1) building block.

d. Substation Buildings and Establishment

Zone substations can be divided into categories by size and confguration:

i CBD

ii Major Outdoor

iii Major Indoor

iv Major 2 Indoor

v Medium Outdoor

vi Medium Indoor

vii Small Outdoor

viii Small Indoor

Subtransmission substations can be divided into two categories by size:

i Large

Ii Small

For valuation purposes, the unit is one (1) building block.

e. Power Transformers

Power transformers should be recorded by size.

For valuation purposes, the unit is one (1) transformer

f. HV Overhead Mains

HV overhead mains (distribution lines) can be divided into subgroups by voltage, conductor size and type:

i. 6.6 kV, 11 kV, 22 kV and possibly 33 kV

ii. 185 mm^2, 100 mm^2, 25 mm^2 aluminium or other sizes

iii. 3 phase, single phase, SWER

iv. Lines with more than one voltage.

For valuation purposes, the unit is one (1) km.

g. HV Mains Cables

HV mains cables (distribution cables) can be divided into subtypes by voltage; 6.6 kV, 11 kV, 22 kV and possibly 33 kV.

If considered necessary, they may also be divided by conductor size.

For valuation purposes the unit is one (1) km.

h. Distribution Substations

Distribution substations can be divided into subgroups; pole mounted, ground mounted, indoor, customer.

Distribution substations should be costed without transformers.

The cost of pole mounted substations should include the cost of the pole and associated HV switchgear and equipment (usually HV drop-out fuses and lightning arresters) and LV fuses, installation and earthing.

For ground mounted substations the substation cost is the cost of the additional equipment which is added to the transformer, including the mounting base, enclosure, LV frame, cable terminations, installation mid earthing. The cost of switchgear (usually ring main units) is best kept separate so that it can be adjusted easily to reflect different configurations. The substation building, if any, should be included in the cost of indoor substations but the land value if any should be treated separately.

For kiosk/pad mount substations the substation cost is the cost of the additional equipment which is added to the transformer, including the mounting base, shell, HV and LV switchgear, cable terminations, installation and earthing.

Customer substations, with the substation sited on a customer's premises, should be treated as a subgroup. There is normally little equipment to be included under this asset category other than installation and earthing as the transformer and metering should be itemised separately and the HV switchgear is also best itemised separately.

For valuation purposes the unit is one (1) substation.

i. Distribution Transformers

Distribution transformers should be recorded by size. They may be costed on an average size or on the basis of the particular sizes required.

For valuation purposes the unit is one (1) transformer.

j. LV Overhead Mains

It should not be necessary to divide LV mains into subgroups by conductor size or according to whether there are one, two or three phases. However, the lines should be divided into subgroups by type; overhead, underbuilt.

For valuation purposes the unit is one (1) km.

k. LV Mains Cables

If justified, LV mains cables can also be divided into subgroups on the basis of conductor size but, as with LV overhead mains, this will probably not be necessary.

Adjustments should be made in the valuation for the joint use of trenches.

For valuation purposes the unit is one (1) km.

Services

B.3 Services consist of service mains and fuses for connections to customers, including metering and load control relays. If necessary, services can be divided into subgroups by type; domestic, light commercial and industrial, heavy commercial, and industrial.

B.4 The number of services valued should equal the number of customers. For valuation purposes the unit is one (1) service.

System Control Facilities

B.5 Most networks have only one system control centre that, along with any other system control facilities, can be valued separately. Suppliers of this equipment are operating in a highly competitive environment and the DNSP should have knowledge of what is appropriate for the optimised replacement of existing facilities.

Communication Facilities

B.6 Communication facilities comprise :-

a. Terminal facilities. These can be costed as a group.

For valuation purposes the unit is one (1) terminal.

b. Lines. These can be subgrouped if necessary.

For valuation purposes the unit is one (1) km.

Other Equipment

B.7 Other equipment may include air break switches, auto reclosers, regulators, reactive power support equipment and other items not included in the previous sections. These items should be costed separately and included in the ODRC valuation only if they are clearly needed in the system.

B.8 Public lighting mains and luminaires should be included if owned by the DNSPs.

Emergency Spares

B.9 Emergency spares should be costed separately. Only a prudent level of spares should be included. Spares for assets no longer in service should be excluded.

Appendix C: Standard Replacement Costs and Effective Lives

This Appendix sets out standard replacement costs and asset lives and gives guidance as to their application. It also sets out the methodology to be followed for items where no standard cost is given.

Standard Cost Methodology

C.1 Standard replacement costs have been compiled for most asset categories and are shown in Tables 1 and 2. Conductor size definitions relating to Table 1 and 2 are shown in Table 3. Replacement costs for zone substation building blocks are given in Table 4. Standard replacement costs for large power transformers are included in Table 5.

C.2 The values indicated are installed costs for modern equivalent assets.

C.3 Subject to the additional factors permitted in this Appendix, the costs in Table 1 are the standard costs that shall as a general principle be used in the valuation. However, DNSPs may use their self-assessed values in place of the standard values provided there are justifiable reasons. The reasons shall be stated and adequate information shall be provided to support the self-assessment.

Determination of Costs

C.4 The costs are based on industry incurred costs, best practice and include the following elements:

a. costs of materials delivered to store inclusive of any taxes paid.

b. direct labour including survey, design and construction and labour on-costs incorporating holiday pay, actual sick leave (not sick leave allowances), training, other unproductive time, workers compensation payments, superannuation, payroll tax and FBT.

c. transport and plant costs for delivery and erection.

d. overhead costs as defined in Clause C5.

GST is not included in the rates.

C.5 For the purpose of network valuation, overhead costs should be limited to all corporate and administrative costs associated with the capital planning process and should include all costs associated with

- Preparation of strategy plans
  - Use of consultants
  - Capital rationing processes; project approval and budgeting
- Contract Administration
- Site Supervision
- Construction related corporate administration overhead; asset register data processing including new asset data input, retirements for replaced assets and associated procedures

Overhead costs for support systems and tools should not be included in network valuations since these systems may be capitalised at time of purchase, implementation or redevelopment. They should be valued as non-system assets.

Typically, the base unit rate consists of a 17% application of overhead costs as per the above definition.

Costs for Items for Which No Standard Costs Given

C.6 In assessing costs for asset categories for which no standard costs are shown in Table 1, 2, 4 or 5 or where the valuer's assessed value is lower than the standard cost the following rule shall apply:

Costs shall be fixed on the basis of competitive pricing or estimates thereof; not necessarily the cost of self construction, and shall reflect brownfields construction. The cost elements set out in clauses C.4 & C.5 shall be included in accordance with the following clauses.

C.7 Where information on competitive prices is not available, costs may be constructed on the basis of prime costs plus on-costs in accordance with the following formula:

Replacement Cost = [Direct materials + Plant costs + Direct Labour (1 + LOC)] / (1 – OH)

Where: LOC = Labour on-cost

OH = Overhead cost

C.8 The LOC should not reflect any labour market conditions to which private construction contractors are not subjected.

C.9 As a guide, the LOC should be less than or equal to 55% and the OH should be less than or equal to 17%.

C.10 A profit margin should be incorporated only to the extent that the LOC and OH and all other elements in the replacement cost make-up represent industry best practice and competitive market conditions.

C.11 The value of land and easements should be fixed in accordance with Section 5 of the Guidelines.

C.12 Deleted.

Application of Standard Costs

Developing the Unit Rate

C.13 The standard rates in Table 1 are base rates determined on average conditions for construction difficulty. As the CBD area (Sydney) has special factors such as significant conduiting, council requirements on work hours, significant reinstatement, traffic control, Table 2 contains standard rates for specific CBD assets. The overhead categories are divided into rural and urban reflecting the differences in span length and construction differences where typically rural construction allows relatively straight runs and urban construction typically has an allowance for some deviations from a straight line.

C.14 The unit rate to be applied in valuing the DNSP assets needs to reflect the diversity of ground/terrain conditions, the construction difficulty associated with the different environments and geographic/locational factors.

The adopted unit rate then equals:

Adopted unit rate = Base Rate (table 1) + factors (clause C15).

C.15 Where conditions effect the base rate, the rates in the table below can be added as identified by the DNSP. The basis for adding these additional rates needs to be supportable. This could be achieved by overlaying geographical/terrain areas on a G.I.S and extracting affected qualities.

Factor	Subtransmission Rate $ per km	Distribution Rate $ per km
Overhead		
Optical Fibre OHEW	$17,000	
Single OHEW (Note 1)	$5,000	
Traffic control	$3,500	$2,000
Heavy Clearing	$5,000	$1,000
Rugged Terrain	$2,000	$1,500
Rock Excavation	$3,000	$1,500
Remote Transport	$1,000	$1,000
Cable		
Optical Fibre	$20,000	-
Traffic Control	$3,500	$3,500
Heavy Clearing	$1,000	$1,000
Rugged Terrain	$3,000	$1,500
Rock Excavation	Note 2	Note 2
Reinstatement	Note 3	Note 3
Remote Transport	$1,000	$1,000

Notes

1. Standard rates include OHEW. The rate in the table can be used to adjust lines constructed without OHEW

2. Rock excavation is dependent on a number of factors including amount of rock, type, depth, disposal costs. The DNSP will need to justify the quantities and rates used.

3. Reinstatement is dependent on a number of factors including council requirements, type of surface being restored, area of reinstatement. The DNSP will need to justify the quantities and rates used.

132 kV Subtransmission Lines

C.16 H-pole and single pole rural 132 kV line costs include overhead earth wires and assume a rural environment with a typical span length of 250 m.

C.17 Single circuit 132 kV urban horizontal post insulator construction includes overhead earth wires and assumes a typical span length of 100 m.

66 kV and 33 kV Subtransmission Lines

C.18 The standard 66 kV and 33 kV overhead line costs in Table 1 assume construction with overhead earth wires for 66 kV and without overhead earth wires for 33 kV. For rural construction the typical span length assumed is 200 m and for urban construction 60 m. 66 kV construction is assumed to use post insulators and 33 kV construction is assumed to use fog insulators.

Subtransmission Cables

C.19 Subtransmission cable costs in Table 1 unless indicated others assume single core cables laid direct in ground with joints every 400 metres at 132 kV and 500 metres at 33 kV or 66 kV.

C.20 Termination costs of 33 kV and 66 kV cables are shown separately. For outdoor terminations, the cost of the termination includes the cost of a wood pole.

C.21 Unless a category is indicated in Table 1, the cost of double circuit cables or cables of differing voltages laid together incorporate the marginal cost of the extra cable, materials, trenching, reinstatement and laying in a common trench.

Distribution Lines

C.22 The standard overhead 22 kV and 11 kV line costs in Table 1 have been compiled on the basis of a rural environment with 120 m spans, except for extra-light and steel which assume 300 m spans. For urban lines the typical span length assumed is 40 m. The typical span assumed for SWER lines (12.7 and 19.1 kV) is 200 m.

C.23 The standard cost of circuits of lower voltage erected on the same supports as higher voltage lines (ie underbuilt) should reflect the marginal cost of additional materials and installation. Most of the factors described in Clause C15 would be included in the cost of the higher voltage asset.

C.24 Costs for special configurations (eg composite 33 kV / 11 kV / LV lines) shall be determined by the valuer in accordance with Clause C.6.

C.25 The cost of equipment used on distribution overhead lines should include only the marginal equipment and installation costs of adding the equipment to the line.

C.26 For covered conductor construction a 40m span in an urban environment is assumed, whilst in rural areas a 75 m span is assumed.

Distribution Cables

C.27 Unless a category is indicated in Table 1 the underground cable costs in Table 1 assume laying in an urban area using three core aluminium conductor XLPE cables, direct buried with joints every 500 m.

C.28 Unless a category is indicated in Table 1 the cost of double circuit (viz two) cables or cables of differing voltages laid together should include the marginal cost of the extra cable, materials, trenching, reinstatement and laying in a common trench.

Zone Substations

C.29 Replacement costs for zone substations are based on building blocks as indicated in Appendix B, clauses B.2 (c) and B.2 (d). The replacement cost of power transformers are separately valued as given in Table 5.

C.30 Where replacement costs are not given in Table 4, the value shall be determined in accordance with Clause C.6

Distribution Substations

C.31 The standard costs for distribution substations in Table 1 include the items listed in Appendix B, clause B.2(h).

C.32 Chamber substations costs depend on the complexity of the design. Table 1 indicates costs with and without LV ACBs and protection.

Distribution Transformers

C.33 Standard costs for distribution transformers in Table 1 are for standard sizes available, inclusive of installation. Where the presently installed size is not now available, the next size down should be used.

Low Voltage Overhead Lines

C.34 The standard costs in Table 1 for low voltage overhead lines apply to both urban and rural situations and assume wood pole construction.

Low Voltage Cables

C.35 The low voltage cable costs in Table 1 assume laying in an urban area with developed infrastructure but excluding electricity reticulation and other services.

Customer Service Connections

C.36 The standard cost in Table 1 for an overhead service assumes a 15 m service of 16 mm² cable. Where a road crossing is required, the cost of a service pole and an additional 25 m service of 16 mm² cable should be added.

Revenue Meters and Load Relays

C.37 The standard costs for LV metering assume two single phase meters and load control devices. Costs are for material only as it is assumed that wiring is carried out at the customer's expense.

Public Lighting

C.38 The standard costs for public lighting assume that separate control low voltage mains are not required. The cost of lamps erected on wood poles allow for light, bracket, connection cable, control cell and installation. For lamps using light standards the cost of the mast is included.

Standard Asset Effective Lives

C.39 Standard asset effective lives are given in Table 1. The assets in Table 2 are to be allocated the same lives as Table 1. The wet and dry areas, particularly for poles, are to be based on data available from Bureau of Meteorology. As a guide the wet life should apply to areas where the long-term average annual rainfall is greater than 900 mm.

C.40 Where an asset is made up of a number of items that have differing lives, a weighted average life has been determined.

C.41 Lives for assets not listed in Table 1 or where lives can be otherwise justified should be established in accordance with clause 3.5.1 in the Guidelines.

C.42 Where assets are refurbished the valuer shall assign a life, effective from the time of refurbishment, that is not greater than the standard life in Table 1.

C.43 The life of each asset commences when the equipment is commissioned for the first time or refurbished. If the year of first commissioning or refurbishment is unknown, a reasonable estimate shall be made.

C.44 Where life extension is applied eg. Pole pinning (staking) the cost of the life extension work shall be capitalised and added to the valuation. The asset shall be depreciated at the same rates as before life extension.

C.45 No added life shall be assigned in the calculation of remaining life except as provided for in clause C.42.

C.47 The life of an asset shall be reduced by the valuer where it is considered that its remaining economic, safety or technical life so warrants.

Periodic Updating of Table 1

C.49 The standard costs and asset lives shown in the Tables will be updated periodically in consultation with the industry to reflect changing costs and technological advances.

Table 1: Table of Standard Replacement Costs and Effective Lives

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
SUBTRANSMISSION LINES					
OVERHEAD LINES (132 kV)					
132 kV Double Circuit Steel Lattice Tower		a			
• Rural Heavy – single conductor	km		205	60	
• Rural Heavy – twin conductor	km		221	60	
• Rural Medium – single conductor	km		175	60	
• Rural Medium – twin conductor	km		175	60	
• Rural Light – single conductor	km		144	60	
• Rural Light – twin conductor	km		144	60	
• Urban Heavy – single conductor	km		205	60	
• Urban Heavy – twin conductor	km		221	60	
• Urban Medium – single conductor	km		175	60	
• Urban Medium – twin conductor	km		175	60	
• Urban Light – single conductor	km		144	60	
• Urban Light – twin conductor	km		144	60	
132 kV Single Circuit Steel Lattice Tower		a			
• Urban Medium – single conductor	km		128	60	
132 kV H Pole					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		86	45	55
• Rural Medium	km		76	45	55
• Rural Light	km		70	45	55
• Urban Heavy – single conductor	km		86	45	55
• Urban Heavy – twin conductor	km		92	45	55
• Urban Light	km		70	45	55
Concrete Pole					
• Rural Heavy	km		92	55	
• Rural Medium	km		83	55	
• Rural Light	km		77	55	
• Urban Heavy – single conductor	km		-	55	
• Urban Heavy – twin conductor	km		-	55	
• Urban Light	km		-	55	
132 kV Single Circuit Pole					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		127	45	55
• Rural Medium	km		-	45	55
• Rural Light	km		56	45	55

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
Concrete Pole					
• Rural Heavy	km		130	55	
• Rural Medium	km		125	55	
• Rural Light	km		59	55	
132 kV Double Circuit Horizontal Post Insulator		.			
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		-	45	55
• Rural Medium	km		-	45	55
• Urban Heavy	km		145	45	55
• Urban Medium	km		131	45	55
• Urban Light	km		121	45	55
Concrete Pole					
• Rural Heavy	km		153	55	
• Rural Medium	km		140	55	
• Urban Heavy	km		153	55	
• Urban Medium	km		140	55	
• Urban Light	km		130	55	
132 kV Single Circuit Horizontal Post Insulator					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		-	45	55
• Urban Heavy	km		96	45	55
• Urban Medium	km		89	45	55
• Urban Light	km		84	45	55
Concrete Pole					
• Rural Heavy	km		104	55	
• Urban Heavy	km		104	55	
• Urban Medium	km		98	55	
• Urban Light	km		95	55	
Steel Pole					
• Urban Heavy (Steel pole)	km		104	55	
UNDERGROUND CABLES (132 kV)					
132 kV Underground Cable					
• Extra Heavy	km		1,300	45	
• Heavy	km		1,100	45	
• Medium	km		964	45	
132 kV Terminations					
• Overhead	no		68	45	
• Indoor	no		76	45	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
OVERHEAD LINES (66 kV)					
66 kV Double Circuit Steel Lattice Tower					
• Rural Light	km		100	60	
66 kV Overhead Lines					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		67	45	55
• Rural Medium	km		59	45	55
• Rural Light	km		53	45	55
• Urban Heavy	km		122	45	55
• Urban Medium	km		117	45	55
• Urban Light	km		103	45	55
Concrete Pole					
• Rural Heavy	km		75	55	
• Rural Medium	km		68	55	
• Rural Light	km		59	55	
• Urban Heavy	km		141	55	
• Urban Medium	km		134	55	
• Urban Light	km		-	55	
UNDERGROUND CABLES (66 kV)					
66 kV Underground Cables					
• Heavy	km		700	45	
• Medium	km		664	45	
66 kV Terminations					
• Overhead	no		58	45	
• Indoor	no		37	45	
OVERHEAD LINES (33 kV)					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		61	45	55
• Rural Medium	km		55	45	55
• Rural Light	km		52	45	55
• Rural Extra Light	km		50	45	55
• Urban Heavy	km		101	45	55
• Urban Medium	km		96	45	55
• Urban Light	km		91	45	55
• Urban Extra Light	km		91	45	55
Concrete Pole					
• Rural Heavy	km		68	55	
• Rural Medium	km		63	55	
• Rural Light	km		59	55	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
• Rural Extra Light	km		55	55	
• Urban Heavy	km		121	55	
• Urban Medium	km		116	55	
• Urban Light	km		111	55	
• Urban Extra Light	km		-	55	
UNDERGROUND CABLES (33 kV)					
33 kV Underground Cables					
• Extra Heavy	km		600	45	
• Heavy	km		550	45	
• Medium	km		500	45	
• Light	km		450	45	
Terminations					
• Overhead	no		30	45	
• Indoor	no		12	45	
EQUIPMENT (66 kV & 33 kV)					
• 66 kV Regulators	no		115	50	
• 33 kV Regulators	no		76	50	
• 33 kV Reclosers	no		0.58	35	
• Pilot Cables	km		30	60	
Air Break Switches 3 phase					
• 66 kV	no		18.1	35	
• 33 kV	no		11.5	35	
Fuses - 3 phase set					
• 33 kV	no		11.4	35	
Links - 3 phase set					
• 66 kV	no	b	-	35	
• 33 kV	no		8.1	35	
DISTRIBUTION OVERHEAD LINES					
SWER Lines				*Wet*	*Dry*
• Heavy	km		10.9	45	55
• Light	km		10.4	45	55
11/22 kV - 3 phase					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		27.8	45	55
• Rural Medium	km		23.7	45	55
• Rural Light	km		21.8	45	55
• Rural Extra Light	km		12.7	45	55
• Rural Steel	km		9.8	45	55
• Urban Heavy	km		50	45	55

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
• Urban Medium	km		45	45	55
• Urban Light	km		42	45	55
Concrete Pole					
• Rural Heavy	km		28.7	55	
• Rural Medium	km		28	55	
• Rural Light	km		24.5	55	
• Rural Extra Light	km		14.7	55	
• Rural Steel	km		11.8	55	
• Urban Heavy	km		62	55	
• Urban Medium	km		60	55	
• Urban Light	km		56	55	
11/22 kV - 3 phase Underbuilt					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		19.3	45	55
• Rural Medium	km		18.7	45	55
• Rural Light	km		16.3	45	55
• Urban Heavy	km		32	45	55
• Urban Medium	km		28	45	55
• Urban Light	km		24	45	55
Concrete Pole					
• Rural Heavy	km		20.6	55	
• Rural Medium	km		19.1	55	
• Rural Light	km		17.7	55	
• Urban Heavy	km		41	55	
• Urban Medium	km		38	55	
• Urban Light	km		36	55	
11/22 kV - 3 phase Covered					
Wood Pole				*Wet*	*Dry*
• Rural Heavy	km		59	45	55
• Rural Light	km		54	45	55
• Urban Heavy	km		76	45	55
• Urban Light	km		72	45	55
Concrete Pole					
• Rural Heavy	km		64	55	
• Rural Light	km		59	55	
• Urban Heavy	km		92	55	
• Urban Light	km		88	55	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)
DISTRIBUTION UNDERGROUND CABLES				
11/22 kV Underground - 3 phase				
• Heavy	km		81	60
• Medium	km		79	60
• Light	km		77	60
11/22 kV Underground – 3 phase / shared trench				
• Heavy	km		70	60
• Medium	km		63	60
• Light	km		21	60
DISTRIBUTION EQUIPMENT				
Capacitor Banks				
• 11 kV 2.5 MVAr	no		127	40
• 11 kV 5 MVAr	no		163	40
• 11 kV 10 MVAr	no		247	40
Gas Insulated Switch				
• 22 kV	no		41	35
Regulators				
• SWER	no		23	35
• 11/22 kV	no		65	35
Reclosers		f		
• SWER hydraulic	no		6.8	35
• SWER electronic	no		11.5	35
• 11/22 kV 3 phase hydraulic	no		20	35
• 11/22 kV 3 phase electronic	no		34	35
Sectionalisers		f		
• SWER	no		3	35
• 11/22 kV 3 Phase	no		8	35
Air Break Switches				
• 11/22 kV 3 phase top pole	no		5.6	35
• 11/22 kV 3 phase mid pole	no		5.2	35
Fuses				
• SWER	no		0.58	35
• 11/22 kV 3 phase	no		1.8	35
Links				
• SWER	no		1.2	35
• 11/22 kV 3 phase	no		1.5	35
• 11/22 kV 1 phase	no		0.58	35

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
DISTRIBUTION TRANSFORMERS (kVA)					
12.7 kV SWER Pole Mount				*Wet*	*Dry*
• 16 kVA	no		2.1	35	45
• 25 kVA	no		2.4	35	45
• 100 kVA	no		8.3	35	45
• Isolating	no		7.6	35	45
19.1 kV SWER Pole Mount				*Wet*	*Dry*
• 16 kVA	no		2.6	35	45
• 25 kVA	no		2.9	35	45
• 25 kVAr reactor	no		2.9	35	45
• 50 kVA	no		7.75	35	45
• Isolating	no		12.4	35	45
11/22 kV - 1 phase Pole Mount				*Wet*	*Dry*
• 16 kVA	no		1.8	35	45
• 25 kVA	no		2.3	35	45
• 63 kVA	no		3.5	35	45
11/22 kV - 3 phase Pole Mount				*Wet*	*Dry*
• 25 kVA	no		3.5	35	45
• 63 kVA	no		4.6	35	45
• 100 kVA	no		5.4	35	45
• 200 kVA	no		7.8	35	45
• 315 kVA	no		11.1	35	45
• 400 kVA	no		12.6	35	45
• 500 kVA	no		15.8	35	45
11 kV - Kiosk and Pad Mount					
• 315 kVA	no		13.8	45	
• 500 kVA	no		17.2	45	
• 750 kVA	no		22.9	45	
• 1000 kVA	no		26.9	45	
• 1500 kVA	no		26.9	45	
22 kV - Kiosk and Pad Mount					
• 315 kVA	no		16.4	45	
• 500 kVA	no		20.5	45	
• 750 kVA	no		30.0	45	
• 1000 kVA	no		33.9	45	
• 1500 kVA	no		36.9	45	
11 kV Cable Box					
• 500 kVA	no		19.9	45	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
• 750 kVA	no		26.9	45	
• 1000 kVA	no		29.5	45	
• 1500 kVA	no		41.0	45	
33 kV - 1 phase Pole Mount				*Wet*	*Dry*
• 25 kVA	no		4.4	35	45
33 kV - 3 phase Pole Mount				*Wet*	*Dry*
• 25 kVA	no		6.3	35	45
• 100 kVA	no		8.7	35	45
• 200 kVA	no		10.9	35	45
• 315 kVA	no		12.9	35	45
• 500 kVA	no		12.9	35	45
33 kV – Kiosk and Pad Mount					
• 500 kVA	no		53.5	45	
• 750 kVA	no		69	45	
• 1000 kVA	no		84.5	45	
• 1500 kVA	no		115.5	45	
33 kV Cable Box					
• 500 kVA	no		53.5	45	
• 750 kVA	no		69	45	
• 1000 kVA	no		84.5	45	
• 1500 kVA	no		115.5	45	
DISTRIBUTION SUBSTATIONS (excluding transformers)					
33 kV - 3 phase					
• Less than 64 kVA	no		6.9	45	
• 64 kVA and greater	no		8.7	45	
33 kV - 1 phase					
• All sizes	no		5.9	45	
33 kV – Kiosk and Pad Mount					
• 500 kVA and greater	no		33.4	40	
33 kV – Chamber Type					
• 1 Transformer	no		56.5	40	
• 2 Transformer	no		113	40	
• 3 Transformer	no		169.5	40	
19.1 kV SWER					
• All sizes	no		4.8	45	
12.7 kV SWER					
• All sizes	no		4.7	45	
11/22kV - 3 phase					
• Less than 64 kVA	no		7.1	45	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
• 64 kVA and greater	no		8.2	45	
11/22 kV - 1 phase					
• All sizes	no		5.7	45	
11/22 kV - Kiosk and Pad Mount					
• Less than 500 kVA	no		27.7	40	
• 500 kVA and greater	no		33.4	40	
11 kV - Chamber Type (w/o LV ACB / protection)					
• 1 Transformer	no		36	40	
• 2 Transformer	no		67	40	
• 3 Transformer	no		97	40	
• 4 Transformer	no		127	40	
11 kV - Chamber Type (c/w LV ACB / protection)					
• 1 Transformer	no		95	40	
• 2 Transformer	no		140	40	
• 3 Transformer	no		195	40	
Distribution Substation Buildings	no	d	100	60	
LOW VOLTAGE					
OVERHEAD LINES (LV)					
LV Lines - 1 phase				*Wet*	*Dry*
• All sizes	km		44	45	55
LV lines - 1 phase covered				*Wet*	*Dry*
• All Sizes	km		18	45	55
LV – 1 phase Underbuilt				*Wet*	*Dry*
• All sizes	km		16	45	55
LV – 1 phase Underbuilt covered				*Wet*	*Dry*
• All Sizes	km		30	45	55
LV Lines 3 phase				*Wet*	*Dry*
• All sizes	km		55	45	55
LV Lines - 3 phase Underbuilt				*Wet*	*Dry*
• All sizes	km		21	45	55
LV Lines - 3 phase Covered				*Wet*	*Dry*
• Less than 300 A	km		51	45	55
• 300 A and greater	km		61	45	55
LV Lines - 3 phase Covered Underbuilt				*Wet*	*Dry*
• All sizes	km		20	45	55
UNDERGROUND CABLES (LV)					
LV Underground - 3 phase					
• Heavy	km		79	60	
• Medium	km		70	60	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)	
• Light	km		60	60	
LV Underground – 3 phase / shared trench					
• Heavy	km		64	60	
• Medium	km		35	60	
• Light	km		16	60	
Terminations					
• Overhead	no		1.7	60	
EQUIPMENT					
• Links - 3 phase set	no		0.8	35	
CUSTOMER SERVICE CONNECTIONS					
Overhead					
• All	no		0.23	35	
• Service Pole	no		1.15	35	
Underground					
• All	no		2.226	60	
REVENUE METERS AND LOAD RELAYS		e			
Load Relays					
• AF Relay	no		0.14	25	
• Time Switch	no		0.17	25	
LV Metering					
• 1 phase	no		0.13	25	
• 1 phase – multiple register	no		0.13	25	
• 1 phase - ½ hour interval	no		0.13	25	
• 3 phase	no		0.42	25	
• 3 phase CTs	no		0.86	25	
• 3 phase CTs (types 3, 4, 5)	no		0.86	25	
HV Metering					
• HV Meter, VT and CT	no	b		25	
STREET & TRAFFIC ROUTE LIGHTING					
Street Lighting (SL) Lines				*Wet*	*Dry*
• Lines – all sizes	km		16	45	55
• Underbuilt	km		16	45	55
• Covered, less than 300 A	km		18	45	55
• Covered, 300 A or greater	km		18	45	55
• Covered Underbuilt	km		18	45	55
SL Underground					
• Heavy	km		79	60	
• Medium	km		70	60	
• Light	km		60	60	

Asset Category and Description	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)
SL Underground in shared trench (HV / LV cable)				
• Heavy	km		64	60
• Medium	km		35	60
• Light	km		16	60
Poles & Standards				
• Traffic wood pole	no		1.7	20
• Traffic standard	no		4.2	20
• Street wood pole	no		0.9	20
• Street standard	no		2.2	20
PITS (HV & LV)				
• HV – CBD	no		-	60
• HV – non CBD	no		18	60
• LV – CBD	no		-	60
• LV – non CBD	no		10	60
OTHER SYSTEM FIXED ASSETS				
CENTRAL FACILITIES				
• SCADA	lot	b		10
• Communications	lot	b		10

Notes:

a) Locality factors applied for Urban and Rural regions.

b) No standard cost applied or where cost included should be treated as a benchmark only.

c) Wet areas are those where the long-term average annual rainfall is greater than 900 mm.

d) A 60 year life can be applied to substation buildings of brick or concrete block construction. A 40 year life applies to wood construction.

e) Contestable metering is not included as a network asset.

f) Recloser and sectionaliser rates include cost of pole.

g) All replacement costs in Table 1 were compiled in January 2001 and should be indexed from that date.

Table 2: Table of Standard Replacement Costs for CBD areas

Asset Category and Description (Note 1)	Unit	Notes	Standard Replacement Cost ($000)
SUBTRANSMISSION UNDERGROUND CABLES		2	
132 kV Underground Cables			
• Extra Heavy	km		1,619
• Heavy	km		1,314
• Medium	km		1,241
• Light	km		1,170
66 kV Underground Cables			
• Extra Heavy	km		1,163
33 kV Underground Cables		3	
• Extra Heavy	km		894
• Heavy	km		800
• Medium	km		685
• Light	km		670
DISTRIBUTION UNDERGROUND CABLES		4	
11/22 kV Underground Cables - 3 Phase			
• Extra Heavy	km		140
• Extra Heavy and Heavy in one trench	km		185

Notes

1. The categories listed here are specifically related to CBD areas. These assets have more expensive standard replacement costs due to the specific conditions encountered in these areas. The CBD network type is defined as a network that is primarily comprised of underground circuits supplying the central business district of a capital city. Customers, substations, feeders etc within this area will be classified as CBD. CBD Networks are typically known as network systems, and are the dense interconnected systems located in the CBD (Central Business District) of large cities. Characterised by levels of service security and interconnection provided. Have interconnected Primary (HV) as well as interconnected Secondary (LV) lines fed from multiple transformers, so customers will automatically be picked up from multiple sources in the event of a cable/equipment failures or outages. Systems are also typically constructed using concrete encased ducts and manholes, constructed below city streets and infrastructures, but in some cases can be direct buried under pavement.

2. Subtransmission underground cable replacement costs are for excavation in unmade ground in a footpath. Adjustment factors from C.15 table will need to be applied for the following:

    - roadway excavation, saw cutting, disposal of all excavated material, fluid backfill, road base, temporary reinstatement, final reinstatement (1.2 m for 132 kV and 0.8 m for 33 and 66 kV), traffic plans, traffic control, restricted working hours, 10% conduit installation

- Where conditions require 100% pit and conduit installation the standard rates in the table should be increased by 15 to 25%.

3. 33kV cables are assumed to be jointed at 250 m, with 3 core for medium and light categories. Heavy is single cables.

4. Distribution underground cables have the following inclusions

   - Joints at every 200 m, 50% conduit installation, disposal of 75% of excavated material and import of 75% sand backfill, traffic plans, minimal traffic control

   - Where conditions require 100% pit and conduit installation and roadway excavation the standard rates in the table should be increased by 30%.

Table 3: Conductor Size Definitions – Aluminium Cross Sectional Areas

Construction	Voltage (kV)	Definition
Overhead Lines	132	Heavy $\geq$ 500 mm^2 Medium $\geq$ 300 mm^2 < 500 mm^2 Light < 300 mm^2
	66	Heavy $\geq$ 400 mm^2 Medium $\geq$ 200 mm^2 < 400 mm^2 Light < 200 mm^2
	33	Heavy $\geq$ 300 mm^2 Medium $\geq$ 185 mm^2 < 300 mm^2 Light $\geq$ 100 mm^2 < 185 mm^2 Extra-Light < 100 mm^2
	11/22	Heavy $\geq$ 185 mm^2 Medium $\geq$ 70 mm^2 < 185 mm^2 Light $\geq$ 35 mm^2 < 70 mm^2 Extra-Light $\geq$ 15 mm^2 < 35 mm^2 Steel < 15 mm^2
	11 Covered	Heavy $\geq$ 240 mm^2 Light < 240 mm^2
	SWER	Heavy $\geq$ 15 mm^2 Light < 15 mm^2
	LV	Heavy $\geq$ 70 mm^2 Light < 70 mm^2
	LV Covered	Heavy $\geq$ 150 mm^2 Light < 150 mm^2

Construction	Voltage (kV)	Definition
Underground Cables	132	Extra Heavy ≥ 1200 mm^2 Heavy ≥ 800 mm^2 Medium ≥ 630 mm^2
	66	Extra Heavy ≥ 1200 mm^2 Medium < 630 mm^2
	33	Extra Heavy ≥ 1200 mm^2 Heavy ≥ 630 mm^2 Medium > 185 mm^2< 630 mm^2 Light < 185 mm^2
	11	Extra Heavy ≥ 500 mm^2 Heavy ≥ 185 mm^2< 500 mm^2 Medium ≥ 70 mm^2 < 185 mm^2 Light < 70 mm^2
	LV	Heavy ≥ 185 mm^2 Medium ≥ 70 mm^2 < 185 mm^2 Light < 70 mm^2

Table 4: Standard Rates for Zone Substations

Asset Category and Description (Note 1)	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)
132 kV GIS – feeder, bus section or transformer	no	2	-	45
132 kV outdoor – feeder	no		375	45
132 kV outdoor – bus section	no		335	45
132 kV outdoor – transformer	no	3	425	45
132 kV outdoor – feeder (no CB)	no		175	45
132 kV outdoor – bus section (no CB)	no		175	45
132 kV outdoor – transformer (no CB)	no	3	325	45
66 kV outdoor – feeder	no		330	45
66 kV outdoor – bus section	no		250	45
66 kV outdoor – transformer	no	3	280	45
66 kV outdoor – feeder (no CB)	no		170	45
66 kV outdoor – bus section (no CB)	no		130	45
66 kV outdoor – transformer (no CB)	no	3	200	45
66 kV indoor – feeder	no		270	45
66 kV indoor – bus section	no		190	45
66 kV indoor - transformer	no		300	45
66 kV capacitor bank	no	4	430	45
33 kV outdoor - feeder	no		250	45
33 kV outdoor – bus section	no		200	45
33 kV outdoor – transformer	no	3	190	45
33 kV outdoor – feeder (no CB)	no		110	45
33 kV outdoor – bus section (no CB)	no		151	45
33 kV outdoor – transformer (no CB)	no	3	70	45
33 kV outdoor – transformer (expulsion fuse)	no		60	45
33 kV indoor – feeder	no		230	45
33 kV indoor – bus section	no		154	45
33 kV indoor - transformer	no		250	45
33 kV capacitor bank	no	4	350	45
11/22 kV outdoor – feeder	no		90	45
11/22 kV outdoor – bus section	no		83	45
11/22 kV outdoor – transformer	no		110	45
11/22 kV outdoor – feeder recloser	no		45	45
11/22 kV outdoor – bus section (no CB)	no		63	45
11/22 kV indoor – single feeder	no		45	45
11/22 kV indoor – double feeder single protection	no		80	45
11/22 kV indoor – double feeder double protection	no	5	90	45
11/22 kV indoor – bus section	no		80	45
11/22 kV indoor – transformer	no		105	45

Asset Category and Description (Note 1)	Unit	Notes	Standard Replacement Cost ($000)	Standard Life (Years)
11/22 kV indoor – transformer (2 CB)	no		185	45
11/22 kV indoor – transformer (no CB)	no		25	45
11/22 kV load control injection	no		140	45

Notes

1. The zone substation unit rates, building block approach allows each zone substation to be valued by combining the corresponding number of building block components. However it needs to be recognised that in using standard rates they may need to be varied to cover factors such as:

    - construction difficulties due to location
    - remote area additional labour and material costs
    - more extensive earthing requirements
    - more complex protection scheme
    - less complex arrangements than standard building block definition.

    It should be noted that these factors may result in actual costs varying significantly from the standard unit rates. These costs should be valued in accordance with clause C6.

2. GIS valuation should be done in accordance with Clause C6.

3. The rate may change depending on the complexity or bunding, blast and firewalls. The standard rates assume foundation, building and simple oil separation.

4. Rate will depend of the size of capacitor bank and complexity of protection and control. The standard rates allow for capacitor bank and with inrush reactors of $200,000.

5. Rate will depend on complexity of protection. The standard rate includes for standard over–current/earth fault protection.

The following building blocks and standard definitions apply to the rates in Table 4.

Bay Building Blocks

The bay costs include the design, equipment, foundations, steelwork, busbars, secondary wiring, relay and control equipment and the installation labour and commissioning.

132 kV Bays

Equipment	Feeder	Transformer (Note 1)	Bus Section	Bus Section (No CB)
Circuit breaker	1	1	1	-
Earthing switch	1	-	2	-
Isolating switch	2	2	2	2
Fault thrower	1	-	-	-
3 x 1 phase VT's	-	1	-	-
3 x 1 phase CT's	1	1	2	2
Protection relays and panel	1	1	1	-
Busbar connection	1	1	2	2
Sealing end termination	1	1	-	-

Note 1: The transformer bay includes all necessary footings, bunding and oil separation systems required to install a transformer. The transformer supply and erection is not included.

66 kV or 33 kV Bays

Outdoor

Equipment	Feeder	Transformer (Note 1)	Bus Section	Bus Section (No CB)
Circuit breaker	1	1	1	-
Earthing switch	1	-	2	-
Isolating switch	2	1	2	2
3 phase VT	-	1	-	-
3 phase CT	1	1	2	2
Protection relays and panel	1	1	1	-
Busbar connection	1	1	2	2
Landing structure or sealing end termination	1	1	-	-

Note 1: The transformer bay includes all necessary footings, bunding and oil separation systems required to install a transformer. The transformer supply and erection is not included.

Indoor

Equipment	Feeder	Transformer (Note 1)	Bus Section
Circuit breaker (built in CT's)	1	1	1
3 phase VT	-	1	-
Protection relays	1	1	-
50 m cable and cable termination	1	1	-

Note 1: The transformer bay includes all necessary footings, bunding and oil separation systems required to install a transformer. The transformer supply and erection is not included.

132, 66 or 33 kV Capacitor Bank or Reactor Bay

The building block will include:

- circuit breaker
- isolator
- 3 phase capacitor or reactor assembly including support structure
- 3 phase inrush reactors
- current transformers
- protection relays and panel
- busbar connections

22/11 kV Bays

Indoor

Equipment	Feeder	Transformer (Note 1)	Bus Section
Circuit breaker (built in CT's)	1	1	1
3 phase VT	-	1	-
Protection relays	1	1	-
50 m cable and cable termination	1	1	-

Note 1: Transformer cost not included. Footing costs in primary voltage bay costs.

Outdoor

Equipment	Feeder	Transformer (Note 1)	Bus Section
Circuit breaker (including CT's)	1	1	1
3 phase VT	-	1	-
Isolator	2	1	2
Protection relays	1	1	-
Busbar connection	1	1	2
Sealing end termination	1	1	-

Notes:

1. Transformer cost not included. Footing costs in primary voltage bay costs.

Site Establishment – Outdoor switchyard

The building block includes:

- Site establishment - survey, site earthworks, landscaping, drainage, roads, surface material and fences. Land purchase is excluded.
- Electrical works - earth grid, auxiliary supply, lightning protection, floodlighting, AC and DC panels, batteries and chargers, metering, bus zone protection and common control system.

Site establishment - Indoor Substation

The building block includes:

- Site establishment - survey, architectural and general civil (drainage, access road).
- Electrical works - earth grid, auxiliary supply, AC and DC panels, batteries and chargers, metering, bus zone protection and common control system.

Table 5: Standard Substation Building and Establishment Costs

Category	Description	Cost in $k
CBD	Area and facilities associated with substations located in the CBD including up to - four 132/110/22/11 kV transformers, six 132/110 kV circuit breakers, forty 22/11 kV circuit breakers, ten 22/11 kV capacitor banks, two sets of AF injection units, four SST's protection and control gear including SCADA, up to four banks of batteries, all auxiliary circuits and wiring, fire protection / indication systems, earthing systems, cable basement and security	10,000

Category	Description	Cost in $k
Major OD	Area and facilities associated with outdoor substations including up to - four 132/66/33/22/11 kV transformers, seven outdoor 132 kV or 66 kV circuit breakers, nineteen 33 kV circuit breakers or twenty three 22/11 kV circuit breakers, four 22/11 kV capacitor banks, two sets of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	2,500
Major ID	Area and facilities associated with indoor substations including up to - four 132/66/33/22/11 kV transformers, seven 132 kV or 66 kV circuit breakers, nineteen 33 kV circuit breakers or twenty three 22/11 kV circuit breakers, four 22/11 kV capacitor banks, two sets of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	2,800
Major 2 ID	Area and facilities associated with indoor substations including up to - four 132/66/33/22/11 kV transformers, ten 132 kV or 66 kV circuit breakers, nineteen 33 kV circuit breakers or twenty three 22/11 kV circuit breakers, fifteen indoor 33 kV or 11 kV circuit breakers, four 22/11 kV capacitor banks, two sets of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	4,100
Medium OD	Area and facilities associated with outdoor substations including up to - two 66/33/22/11 kV transformers, three outdoor 66 kV circuit breakers, seven 33 kV circuit breakers or eleven 22/11 kV circuit breakers, two 22/11 kV capacitor banks, two sets of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	1,900
Medium ID	Area and facilities associated with indoor substations including up to - two 66/33/22/11 kV transformers, three 66 kV circuit breakers, nineteen 33 kV circuit breakers or twenty three 22/11 kV circuit breakers, four 22/11 kV capacitor banks, two sets of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	2,200
Small OD	Area and facilities associated with outdoor substations including up to - two 33/11 kV transformers, three outdoor 33 kV circuit breakers, eleven 11 kV circuit breakers, two capacitor banks, one set of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	350
Small ID	Area and facilities associated with indoor substations including up to - two 33/11 kV transformers, three indoor 33 kV circuit breakers, eleven 11 kV circuit breakers, two capacitor banks, one set of AF injection units, two SST's protection and control gear including SCADA, up to two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, fire protection / indication systems, earthing, earthing systems, fence, oil containment and security	450
Large STS	Area and facilities associated with large sub-transmission substations including up to – six 132 kV transformers, eleven 132 kV circuit breakers, twenty nine 33 kV circuit breakers, six 33 kV capacitor banks, three SST's protection and control gear including SCADA, three banks of batteries, all auxiliary circuits and wiring, AC and DC boards, earthing, earthing systems, fence, fire protection / indication systems, oil containment and security	5,000

Category	Description	Cost in $k
Small STS	Area and facilities associated with small sub-transmission substations including up to – three 132 kV transformers, five 132 kV circuit breakers, fourteen 33 kV circuit breakers, three 33 kV capacitor banks, two SST's protection and control gear including SCADA, two banks of batteries, all auxiliary circuits and wiring, AC and DC boards, earthing, earthing systems, fence, fire protection / indication systems, oil containment and security	3,000

Notes

1. No amenities are provided for in the building layout ie. no lunch room, toilets or other work spaces.

2. Cable basements are included for CBD, Major ID and Major 2 ID substations only.

3.

Table 6: Standard Asset Values For Power Transformers

Voltage	MVA	Unit Price $	Classification
33/11 kV	1.5	115,500	ONAN
	2.5	177,500	ONAN
	5	268,500	ONAN
	7.5	294,000	ONAN
	10	319,500	ONAN
	10/12.5	345,000	ONAN/ONAF
	15/20	421,000	ONAN/ONAF
	15/20/25	472,500	ONAN/ONAF/OFAF
	20/28/35	560,000	ONAN/ONAF/OFAF
66/11 kV	2.5	187,000	ONAN
	5	280,000	ONAN
	7.5	305,000	ONAN
	10	375,500	ONAN
	10/14	420,000	ONAN/ONAF
	15/20/25	507,500	ONAN/ONAF/OFAF
	20/28/35	607,500	ONAN/ONAF/OFAF
66/33/11 kV	7.5	360,000	ONAN
	15	700,000	ONAN
132/11 kV	15/20/25	638,000	ONAN/ONAF/OFAF
	35/40/45	858,000	ONAN/ONAF/OFAF
	50/60/65	1,025,000	ONAN/ONAF/OFAF
132/22 kV	45	914,500	ONAN/ONAF
132/33 kV	20/30	717,500	ONAN/ONAF
	40/60	914,500	ONAN/ONAF
	60/120	1,456,500	ONAN/ONAF
132/66 kV	20/30	815,000	ONAN/ONAF
	30/60	1,025,000	ONAN/ONAF
	60/120	1,456,000	ONAN/ONAF

Asset Condition & Planning Summary

ACAPS4001 Poles

March 2014

Review

Responsibility	Name	Date
Author	**Paul Kril**	**11 June 2013**
Review	**Craig Moody**	**10 July 2013**
Review	**Paul Kril**	**21 March 2014**

Approval

Position	Name	Signature	Date

Amendment History

Version	Comment
2	Amendment following risk review

Disclaimer

All asset data (population, age, etc) in this document was extracted from SAP, or other asset system, on 30/06/2012, unless otherwise noted. All monetary figures are in FY2012/13 dollars, unless otherwise noted.

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This document should be read in conjunction with the 'Replacement & Duty of Care Overview' for details of common concepts and processes.

Contents

1. Executive summary

This document provides an overview of the analysis undertaken and the decisions made to ensure the risks associated with the maintenance of overhead poles are managed in an efficient, safe and cost effective manner.

Ausgrid aims to optimise the overall reliability, performance and safety of the electricity network using the funding available for maintenance and augmentation work. This is achieved through the implementation of appropriate asset management strategies that consider the condition, utilisation and age of network assets, to ensure the optimised lifecycle cost for our customers.

During the development of the electricity supply network across Ausgrid's distribution area, overhead lines were seen as an efficient and effective means of electrifying developments as they occurred. The period of the late 1960s through to the early 1980s saw rapid expansion of the network, and in particular the overhead (OH) network, in an effort to supply power to a rapidly expanding domestic residential and commercial environment.

Wooden support structures (poles) were seen as the ideal choice to support the OH distribution network due to their inherent qualities: being easy to transport, handle and erect, the abundance of poles available and the low cost at the time.

Ausgrid has more than 513,359 poles supporting the OH network across our distribution area. Pole structures have varied over time, initially constructed of wood, and more recently made of contemporary materials such as steel, concrete, fibreglass and fibre-reinforced material composites, along with pressure impregnated timbers such as copper chromium arsenate (CCA) poles and natural timber poles. Due to Ausgrid's diverse geographic and topographical conditions, poles are of varying heights, materials and strengths.

This document considers a broad category of assets: OH support structures (poles) of all types of construction materials including wood, steel, concrete, composite materials and wood reinforced (nailed) poles. These OH support structures are utilised at all system voltages including sub-transmission and distribution levels as well as those pole structures that support single pole, pole top transformers. Steel lattice towers are considered separately in the appropriate ACAPS documentation.

To optimise the overall reliability, performance and safety of the electricity network, Ausgrid uses asset management strategies, which are detailed in the Replacement and Duty of Care Overview document. These strategies consider the performance, condition, risk and utilisation of all electrical network assets. More specifically, to demonstrate the need for continued prudent capital funding for the replacement of poles, this document details the comprehensive analysis that has been undertaken on this asset group which includes age profiling, failure analysis, risk analysis, options analysis and cost benefit analysis.

Ausgrid has some of the oldest pole support structures in Australia with a number of the regal species timber poles more than 80 years old, timber poles that average 45 years and concrete poles at 55 years.

These poles have known failure modes that have potential to impact the security of the network, and may also pose workplace health and safety issues to field operating, maintenance staff and the community. It is essential that these failure modes are managed correctly, through a combination of inspection, maintenance, preventative, corrective and remedial works, and eventual replacement.

The top three causes of asset failure are:

- Rot below ground.
- Rot/splits above ground.

- General age deterioration.

Following inspection and testing each year, a number of poles are determined to have experienced a corrective failure, as they no longer meet the criteria to remain in service as documented in Ausgrid's *Network Standard – NS 145 Inspection and Treatment Procedures* (June 2011). Wherever it is technically and economically feasible, Ausgrid proposes a condition based nailing sub-program, followed by a 12-year (on average) like-for-like replacement.

It is expected the condition based nailing reinforcement will provide a 12-year life extension (on average) for the pole and will effectively defer the capital replacement costs for the same period, after which time the pole will be replaced. Only where nailing is not possible will pole replacement be undertaken to address the risks posed by these assets.

This option also allows for a transition from uncontrolled failures to controlled failures within the engineered support structure if functional failures occur in the future.

To date, Ausgrid, through its well defined asset management strategies has delivered manageable failure rates, sustained safety and reliability outcomes and efficient costs. An integral part of this strategy is efficient and effective maintenance standards and targeted replacement programs.

The Regulatory Project IDs covered in this document are:

REP_04.02.02

REP_04.02.34

REP_05.02.06

The total expenditure of these sub-programs during the 2010-14 regulatory period is summarised in Table 1.

Table 1- Total expenditure of these sub-programs during the 2010-14 regulatory period

	09/10	10/11	11/12	12/13	13/14
Total $000	$50,328	$45,936	$44,861	$ 46,272	$ 66,870

A view of the current, planned and proposed sub-programs of works is summarised below in Figure 1.

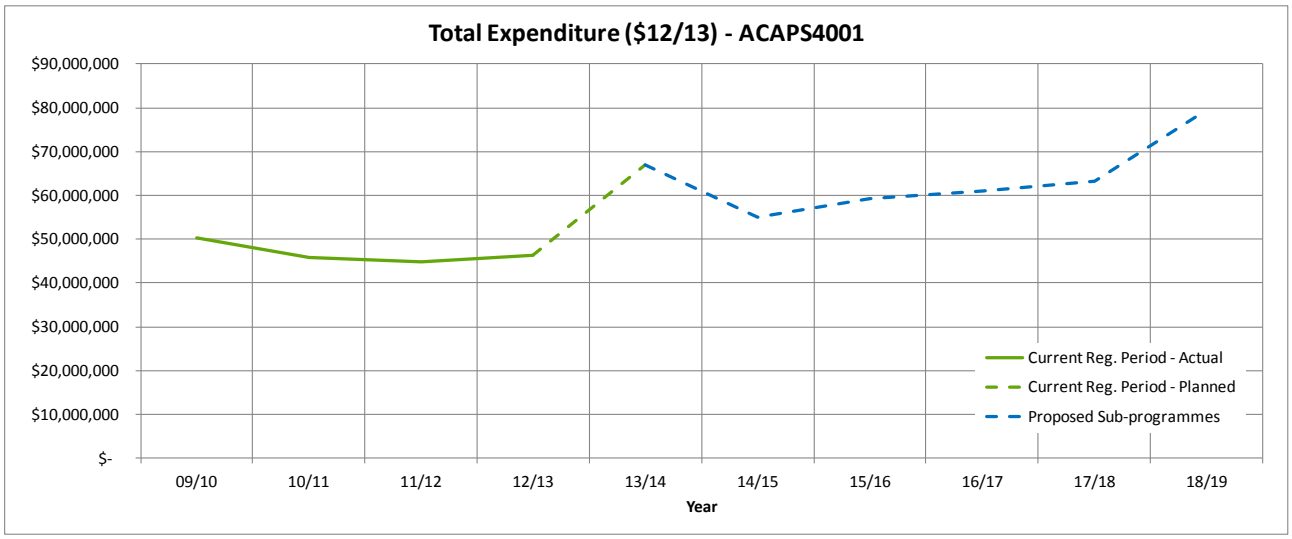


Figure 1 – Total expenditure in 2012/13 dollars

2. Asset Technical Details

2.1. Description of Asset Grouping

A primary method of conveying electricity, especially over large distributed networks, is by overhead construction, i.e. current carrying conductors and associated hardware, supported aloft pole support structures. Pole structures have been in use since the first electricity networks were developed, and continue to be utilised today because of their relative low lifecycle cost.

The primary function of a pole is to support the overhead wires that form part of the electricity network in the air, out of reach of the public, and in the correct location in terms of other assets, such as buildings, the ground, roadways, driveways, foot paths and vegetation.

Pole structures have varied over time. Initially they were constructed from regal species of hardwood timbers (considered a class 1 for durability) such as Iron Bark, Tallowwood and Turpentine and natural round poles in rural areas. Today, poles are made from contemporary materials such as steel, concrete, fibreglass and fibre-reinforced material composites, along with pressure impregnated timbers such as copper chromium arsenate (CCA) poles and natural timber poles.

Poles come in a number of material, height and strength configurations, as either standard or bespoke combinations, to suit a range of environmental and operating parameters. Owing to Ausgrid's diverse geographic and topographical conditions, a number of types of poles of various strength and height configurations are acquired, either as routine items or as short order items, to fill specific network, customer or environmental requirements. The following paragraphs provide a brief overview of some of the predominant and emerging technologies either in use or soon to be in use on the network.

CCA poles are pressure impregnated timbers, usually of a lesser durability (i.e. class 2 or lower). The use of chemical preservative treatments aims to protect the pole and extend the service life of this less durable material. Generally only the sapwood (outer layer) of hardwood poles is able to be treated, due to the composition of cell structures within the timber, particularly in the heartwood (centre of the pole). CCA poles are usually buried directly in the ground.

Conversely, **natural round timbers** are simply trees that have had their limbs and branches stripped to resemble a more typical pole shape. However, due to the natural characteristics of timber, there are large variances in size, shape, straightness and appearance within this type of pole. Natural round poles, as the name suggests, have no preservative treatment applied to them and have their outer layer of sapwood intact, although this provides no structural support to the pole. Natural round poles are usually buried directly in the ground.

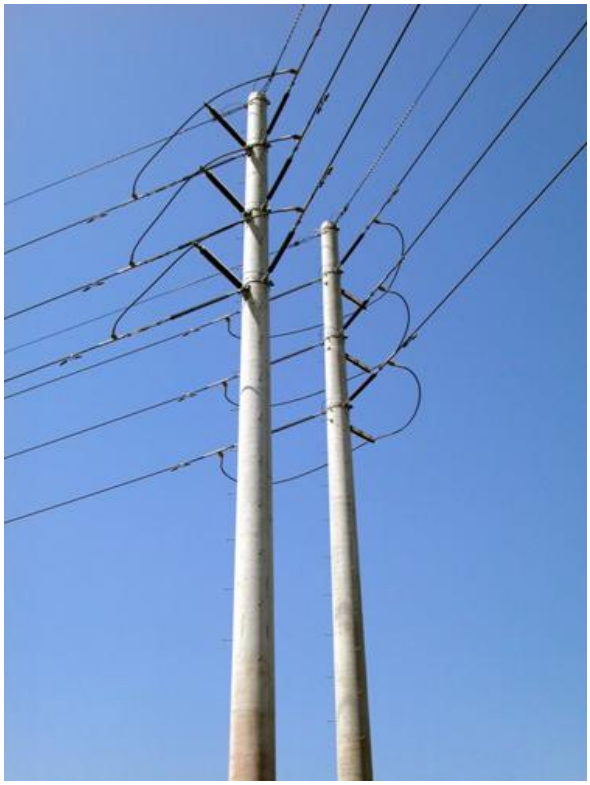
Dressed timber poles are typically class 1 durability timbers, that have been dressed, i.e. had the outer layer of sapwood timber removed. The dressed poles are typically octagonal in shape at the base of the pole and are usually untreated, although some older dressed poles were chemically treated with creosote, giving them a dark brown/black appearance. Accordingly, the chemically treated, dressed poles are sometimes referred to as 'tar' poles. Due to the effects of creosote on the skin and chemical residue in the surrounding earth, this treatment process has been largely discontinued. Dressed timber poles are usually buried directly in the ground.

Nailed poles are timber poles of any type that have been deemed suitable, for technical and economic reasons, for structural reinforcement using a hot dipped, galvanised steel reinforcing member, to restore the groundline strength to an otherwise degraded timber structure. The reinforcing steel member is driven into the ground alongside the pole and is physically bolted through the pole to provide compression and bending strength, as well as torsional strength to the pole, effectively returning the pole to a serviceable condition and deferring replacement for an expected average period of 12 years.

Concrete poles are steel reinforced, hollow section poles, made of concrete that has been reinforced with steel to improve the performance of concrete that is subjected to bending forces. Concrete by itself is extremely good at sustaining compressive forces, but poor at sustaining bending forces. The addition of steel reinforcing allows the concrete to cope with these bending forces without shattering, as the steel affords flexibility to the structure. Concrete poles come in two main forms: cast and spun. Spun poles are the predominant modern form of this type of pole. Concrete poles are usually buried directly in the ground, although pile foundations may be required in certain circumstances where the footing foundation strength is not adequate for the design load.

Steel poles are hollow section structures usually made from mild steel that has been either hot-dipped galvanised, powder coated, epoxy encapsulated or painted to protect the steel from the elements and corrosion. Steel poles can either be directly buried in the ground, or attached to a footing such as a rag bolt assembly, where the steel pole is bolted to a steel reinforced concrete foundation.

Fibreglass and **fibre reinforced composite material poles** represent the latest advances in pole technology and offer some advantages over traditional types of poles. Fibreglass poles are particularly useful in difficult to access locations, as they are modular and lightweight. Fibre reinforced composite poles have the advantage of being lighter than their concrete alternative and offer superior fire performance to timber poles. ‘Titan’ poles, a proprietary product name, are an emerging technology that is showing promise in terms of operational, handling, maintenance and fire performance characteristics. Ausgrid has recently begun trialling these poles for suitability across a number of locations and environments. This advanced technology is also considered a risk reduction option, when poles eventually require replacement. As noted later in the document, when replacement options are considered, this type of pole is also looking promising from an economic evaluation perspective, as the life cycle cost appears favourable, largely due to reduced maintenance costs.



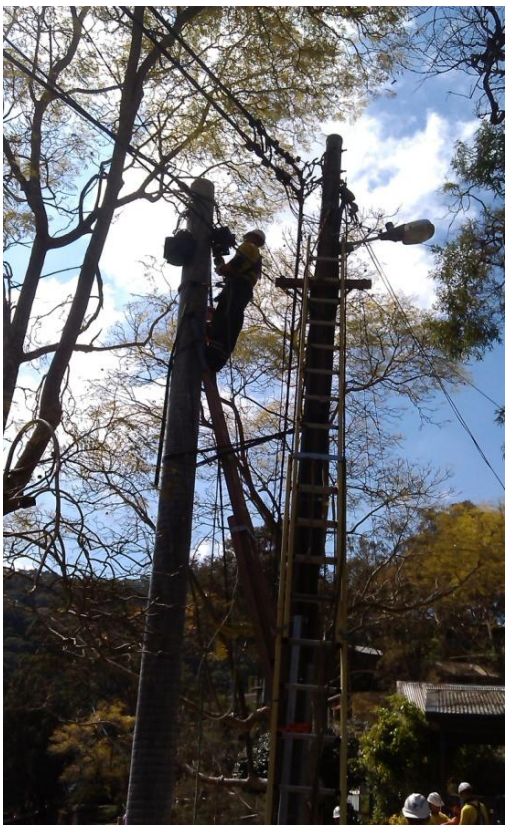


Figure 2 – These pictures are representative of the asset group

2.2. Asset Population

There are 513,539 pole type support structures of all types presently in service across Ausgrid's network, including 60,274 that are purely associated with the street lighting business. Table 2 below shows the population of each of the three broad types of poles including wood, metal and concrete poles.

*Table 2 – Asset population of poles by region, by material type and by voltage level**

Asset group	Material type	Distribution	Street lighting	Transmission	Total
Central Coast	Concrete	159	287	922	1368
	Metal	2936	3120	171	6227
	Wood	52034	406	2469	54909
Central Coast		**55129**	**3813**	**3562**	**62504**
East region	Concrete	17	617	18	652
	Metal	1281	6273	36	7590
	Wood	39311	5260	1	44572
	Not assigned	2	5	0	7
East region		**40611**	**12155**	**55**	**52821**
Hunter region	Concrete	112	13	1988	2113
	Metal	298	2440	197	2935
	Wood	35771	42	3579	39392
	Not assigned	0	0	8	8
Hunter region		**36181**	**2495**	**5772**	**44448**
Lower Hunter region	Concrete	166	20	2211	2397
	Metal	237	8178	75	8490
	Wood	39227	244	5372	44843
Lower Hunter region		**39630**	**8442**	**7658**	**55730**
Newcastle region	Concrete	79	95	569	743
	Metal	454	8155	53	8662
	Wood	43865	636	6460	50961
Newcastle region		**44398**	**8886**	**7082**	**60366**
Northern region	Concrete	434	914	27	1375
	Metal	1902	5915	96	7913
	Wood	92555	3861	2598	99014
	Not assigned	0	1	0	1
Northern region		**94891**	**10691**	**2721**	**108303**
South region	Concrete	21	428	14	463
	Metal	2139	6995	84	9218
	Wood	110859	6369	2458	119686
South region		**113019**	**13792**	**2556**	**129367**

**Note: The 60,274 dedicated street lighting poles included in the total number of poles above have been excluded from this planning summary for forward forecasting purposes of pole replacement needs. They will be addressed by a separate regulatory submission associated with the street lighting business. This leaves a total of 453,265 poles covered by this document.*

*Table 3 – Pole population by region**

East	North	South	Newcastle	Central Coast	Lower Hunter	Upper Hunter
52821	108303	129367	60366	62504	55730	44448

**Note: The 60,274 dedicated street lighting poles included in the total number of poles above have been excluded from this planning summary for forward forecasting purposes of pole replacement needs. They will be addressed by a separate regulatory submission associated with the street lighting business. This leaves a total of 453,265 poles covered by this document.*

The population of nailed poles across Ausgrid's regions is shown in Table 4 below.

Table 4 – Region timber nailed pole population data

Region	Nailed timber reinforced
Central Coast	1448
East region	3194
Hunter region	991
Lower Hunter region	2778
Newcastle region	3648
Northern region	3212
South region	6558
ALL	21829

2.3. Asset Age Data

Ausgrid has some of the oldest pole support structures in Australia with a number of the regal species timber poles being over 80 years old.

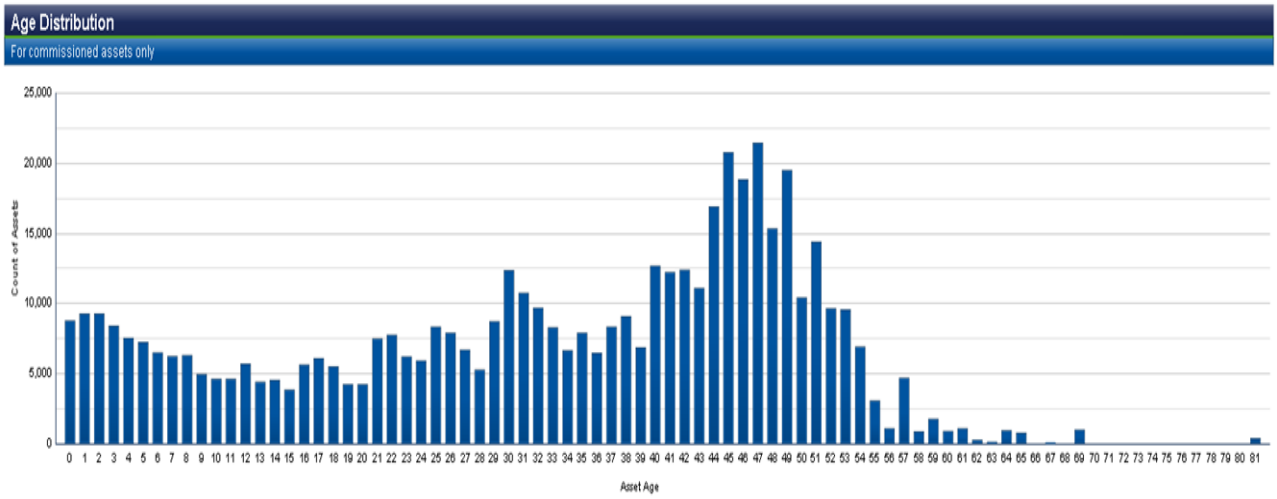


Figure 3 – Total pole population – age profile

From the above graph it can be seen that there are 164,364 poles that are at the standard of life of 45 years or older.

Table 5 – Total pole population age data

Asset category	Average age	Standard deviation	Standard life	% over standard life
Total Pole Population	32.6 years	16.69	45 years	36.46%

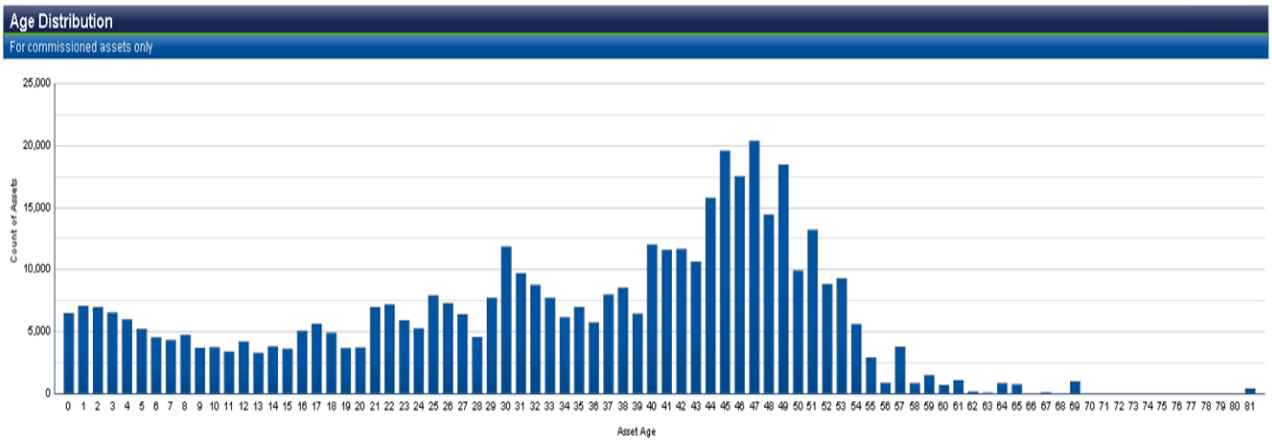


Figure 4 – Wood pole population – age profile

From the above graph it can be seen that there are 151,977 wood poles that are 45 years old or older.

Table 6 – Wood pole population age data

Asset category	Average age	Standard deviation	Standard life	% over standard life
Wood pole population	33.65 years	16.09	45 years	34.87%

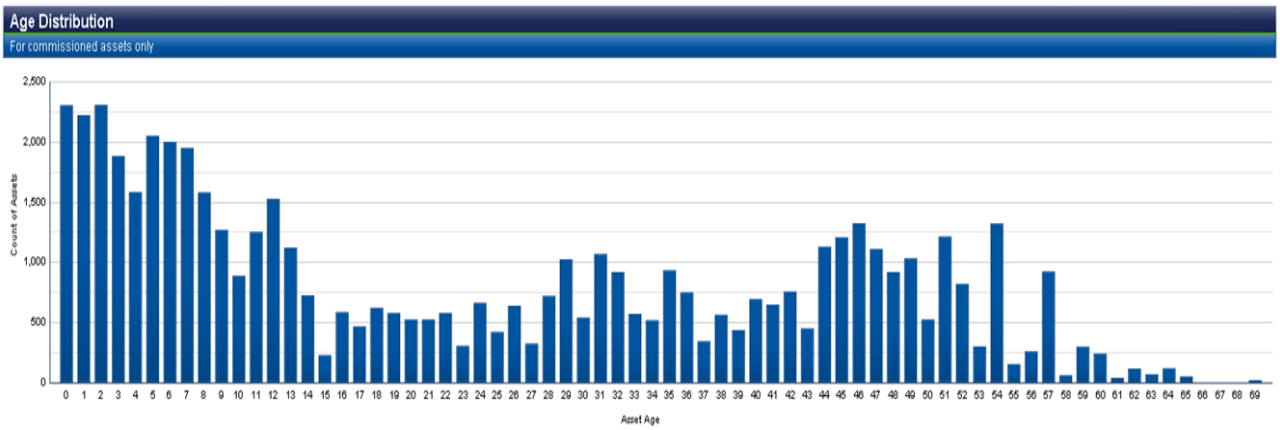


Figure 5 – Concrete and metal pole population – age profile

From the above graph it can be seen that there are 2,367 concrete and metal poles that are at the standard life of 55 years or older.

Table 7 – Concrete and metal pole population age data

Asset category	Average age	Standard deviation	Standard life	% over standard life
Concrete and metal pole population	24.04 years	18.89	55 years	15.42%

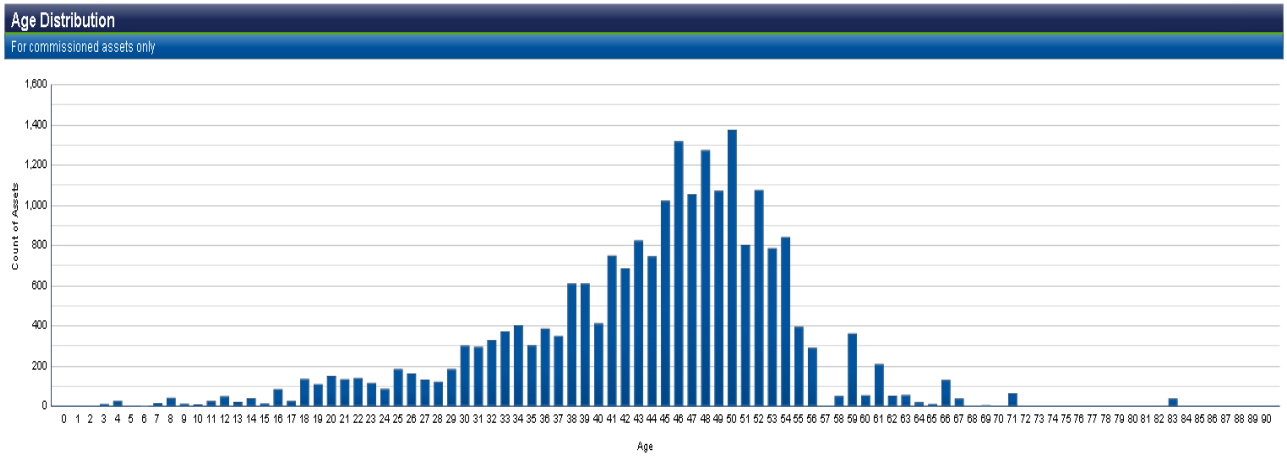


Figure 6 – Timber nailed pole population – age profile

From the above graph it can be seen that there are 11,385 timber nailed poles over 45 years or older.

Table 8 – Total pole population age data

Asset category	Average age	Standard life	% over standard life
Total timber nailed pole population	39.0 years	45 years	52.2%

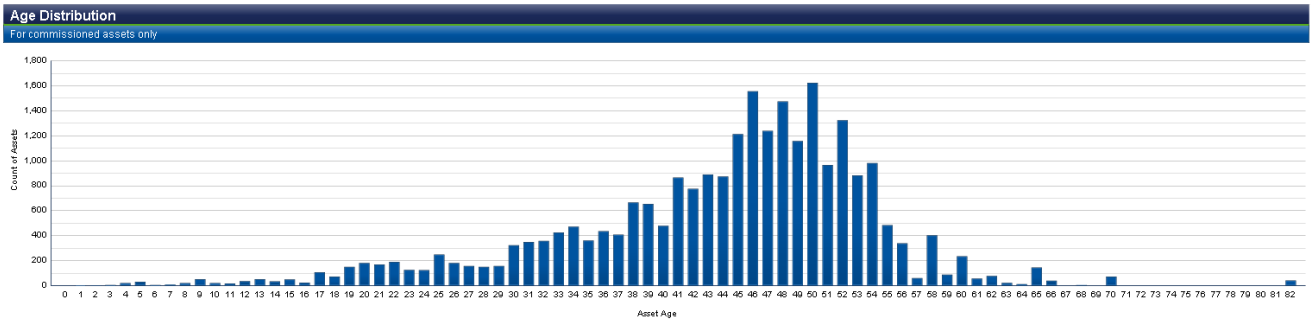


Figure 7 – Reinstated pole population – age profile

Table 9 – Reinstated pole age statistics

Asset category	Weighted average age	Standard deviation	Standard life	% over standard life
Reinstated Poles	43.7	10.31	55 years	52.6%

While the debate around standard accounting and achievable replacement lives of 45, 55 and 60 years for wood, concrete and steel poles continues, it is clear that Ausgrid's experience will be driven by its overwhelmingly large wood pole population. There are minor deviations seen in the metal (9.5%) and concrete (0.5%) population, which have little material effect on the overall requirements of the organisation's asset base. Further detailed analysis can be found in Appendix A.

Given the large variances seen in both the metal and concrete pole defect trends, and the relatively small populations, Ausgrid has considered it prudent to forecast at a population level, allowing it to utilise overall system trends in developing the network's replacement and reinforcement needs, as detailed further in this document.

3. Maintenance, Failure Data and Compliance Issues

3.1. Maintenance Strategy and History

The general approach for routine pole maintenance is to undertake an above ground and a below ground inspection of the asset, to determine the condition and suitability of the pole to remain in service. These tasks are generally covered by the overhead lines inspection maintenance standards (OH0102, OH0103, OH0105, OH0107 and OH0112). These inspections are undertaken on a five yearly inspection cycle, with the above ground and below ground inspections offset by 2.5 years. The above ground inspection process looks for defects such as cracks/splits, vehicle damage, loose fittings/connections, condition of the cross-arm and associated hardware, and the presence of rot/fungal decay or termites between the ground line and the pole top. The below ground inspection process also includes the calculation and assessment of the pole's residual strength and suitability to remain in service, as the inspection assesses the pole from 350mm below ground to 2m above ground line, with a hazard assessment identifying if further inspection is required.

A major review of all maintenance standards associated with key network assets was undertaken in FY2010/11. This involved reviewing the recorded failure history for the assets, assessing the effectiveness of the maintenance practices and analysing the cost/risk trade-off to ensure the new maintenance strategy will deliver acceptable levels of maintenance performance. The maintenance tasks within each standard are also reviewed to ensure the maintenance activities manage the reported failure characteristics, in terms of risk, consequence and cost to effectively prolong the life of the asset.

This review for pole support structures analysed over 33,000 failure notifications that were created between 01/07/2002 and 31/12/2008. Twenty-three new failure mode types were added and an analysis was undertaken to determine if any additional maintenance tasks were required.

Ausgrid's inspection and failure costs are examined for both individual failure modes and as a group of packaged tasks, in order to determine the optimum period of inspection, given the relative real and risk costs associated with the inspection activities. An overview of the MRA analysis undertaken in 2011 is provided in MOI 011 F2 Review of Technical Maintenance Code OH00 00 00 Overhead Lines 20.06.2011.

Previously, pole and line inspections were undertaken at four-year intervals. During the review it was identified that it was possible to extend the pole and line inspection activities to five-year intervals, provided that the two inspection maintenance activities remained offset by half the period, to maintain the optimum period of inspection for these failure modes. The outcome of the analysis was a move from a four-year inspection cycle (latitude six months) to a five-year inspection cycle (latitude four months). In part this can be attributed to the well established and robust maintenance and replacement practices that are in place to manage an ageing population.

In FY2011/12 (YTD 17 June 2012) there were 112,877 below ground maintenance inspections undertaken on pole support structures on Ausgrid's network. The total cost of this work was $10,534,208.00, or just over $93.00 per inspection.

3.2. Failure History

3.2.1. Corrective failures

As noted previously, there are a number of material types used as pole support structures throughout Ausgrid's supply area, although the vast majority are wood or preservative impregnated wood, steel or concrete. A fifth group of poles, known as nailed (wood) poles, also exists.

Over the past three years (FY2009/10 to FY2011/12), Ausgrid has experienced the following corrective failures associated with poles:

Corrective pole failures over time				
2009/10	**2010/11**	**2011/12**	**Total**	**Average**
8395	6131	6986	21512	7170.6

These corrective failures are discussed according to cause and material type below.

All poles

The failure cause data shown in Figure 8 below is from Ausgrid's Corporate Asset Investment Outcomes dashboard. The data includes both breakdown and corrective failure notifications associated with all poles.

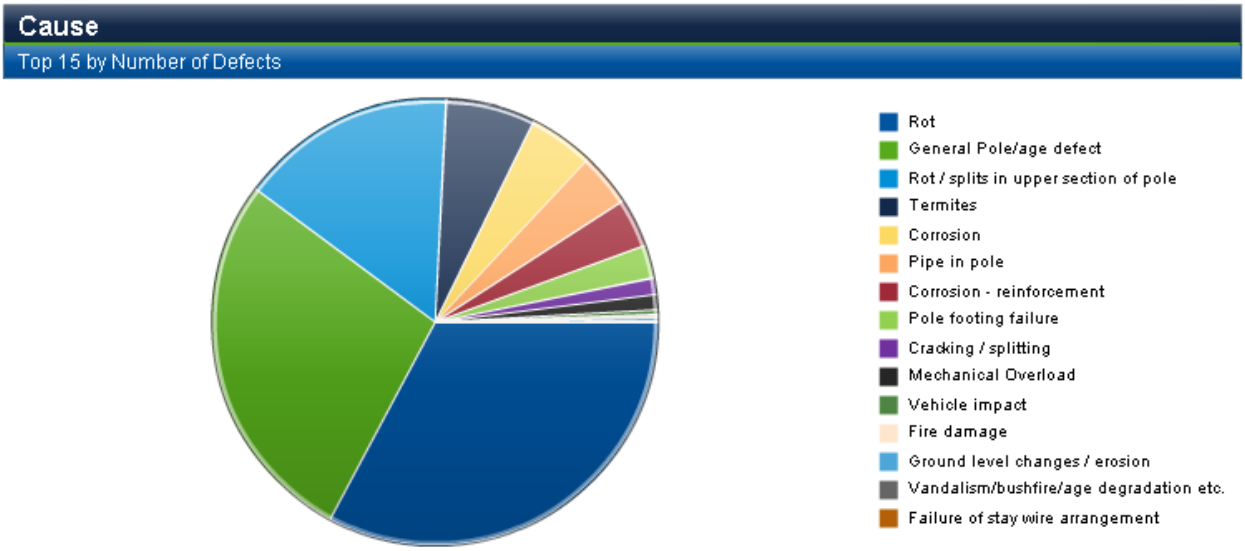


Figure 8 – Total pole population – all material types top 15 causes of failure (by incidence)

Figure 8 represents the top 15 causes of all defects on poles of all material types, grouped into common cause categories, e.g. all types of rot (brown, white, soft, etc) have been grouped together as 'rot', so that the broad failure causes may be clearly visible. The top three causes are:

- Rot below ground.
- General age/deterioration.
- Rot/splits above ground.

Rot below ground and general age/deterioration defects, which reduce the strength of the pole and therefore its ability to support the overhead network, are generally addressed by reinforcing.

The top 15 causes of failures that are capable of being addressed by the pole reinforcing (nailing) life extension policy[1] are shown in Figure 9.

[1]Note: It is Ausgrid's policy to address pole failures by extending the life of the asset by nailing, whenever this option is both technically possible and financially prudent, as per Network Standard NS145.

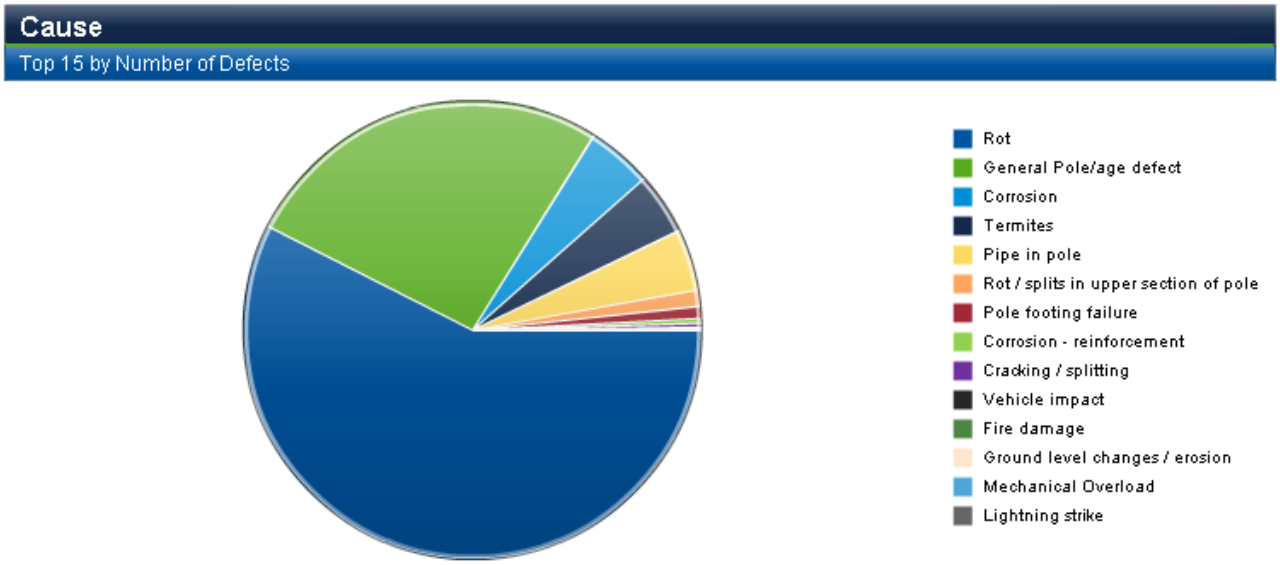


Figure 9 – Total pole population – all material types top 15 causes of failure (by incidence) addressed by nailing

The top three causes are:

- Rot below ground.
- General age/deterioration.
- Corrosion.

The top 15 causes of failures that must be addressed by pole replacement, as they are not capable of being addressed by reinforcing, are shown in Figure 10 below.

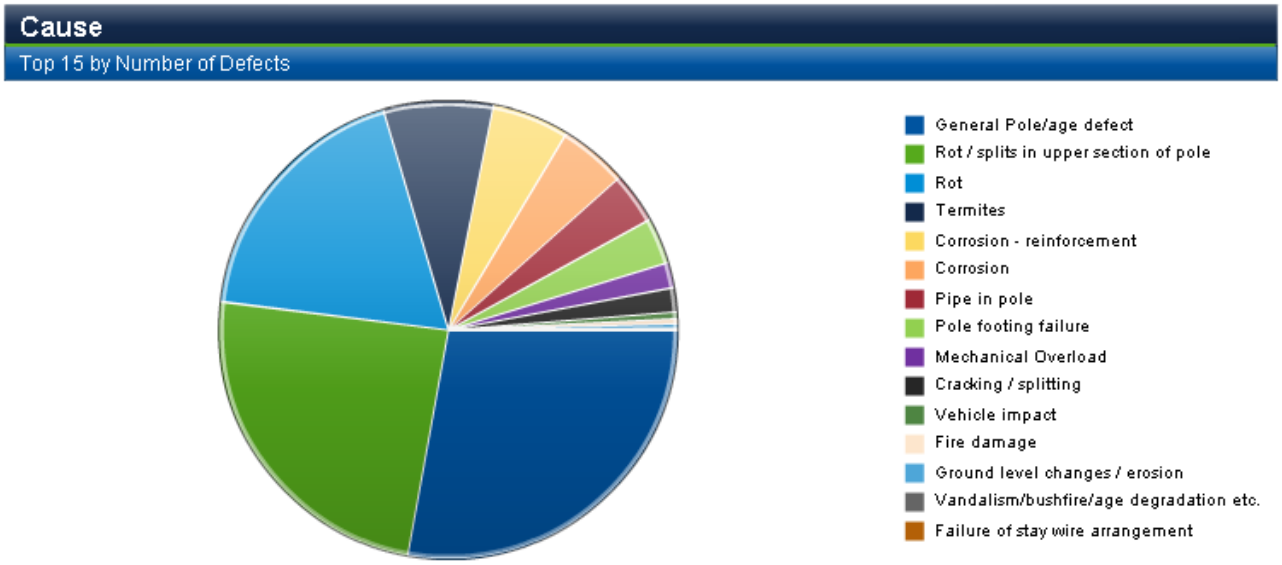


Figure 10 – Total pole population – all material types top 15 causes of failure (by incidence) addressed by replacement

The top three causes are:

- General age/deterioration.
- Rot/splits in the upper section.

- Rot below ground.

Even in the case of defects such as rot/splits above ground, where these defects are not an immediately dangerous defect, Ausgrid takes the opportunity to nail the pole and therefore achieve the maximum life extension possible. Figure 12 illustrates Ausgrid's commitment to reinforcing wherever possible. When examined over time, the results show an average of just under 50 percent of defective poles have been nailed over the last eight years, peaking at over 55 percent.

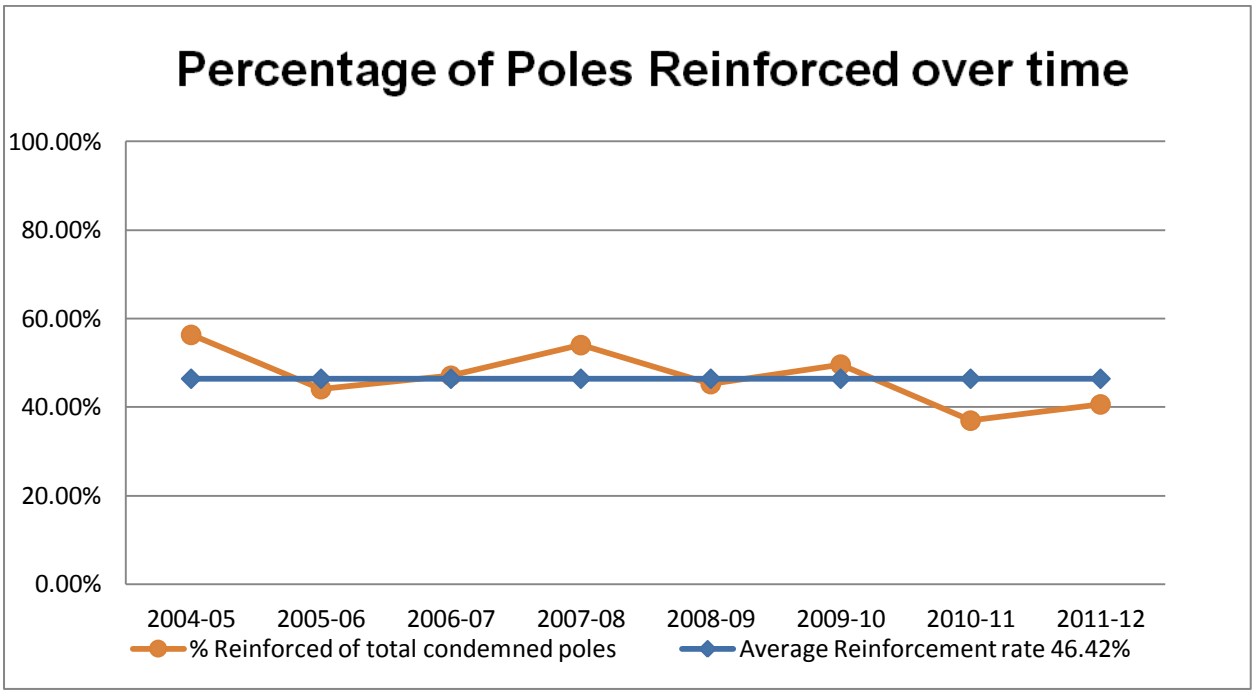


Figure 11 – Percentage of poles reinforced over time

As the properties of pole materials and the associated failure modes differ considerably, the failure history of each of the material groupings has also been separated for examination.

Wood poles

The failure cause data shown in Figure 12 is from Ausgrid's Corporate Asset Investment Outcomes dashboard. The data includes both breakdown and corrective failure notifications associated with all wood poles.

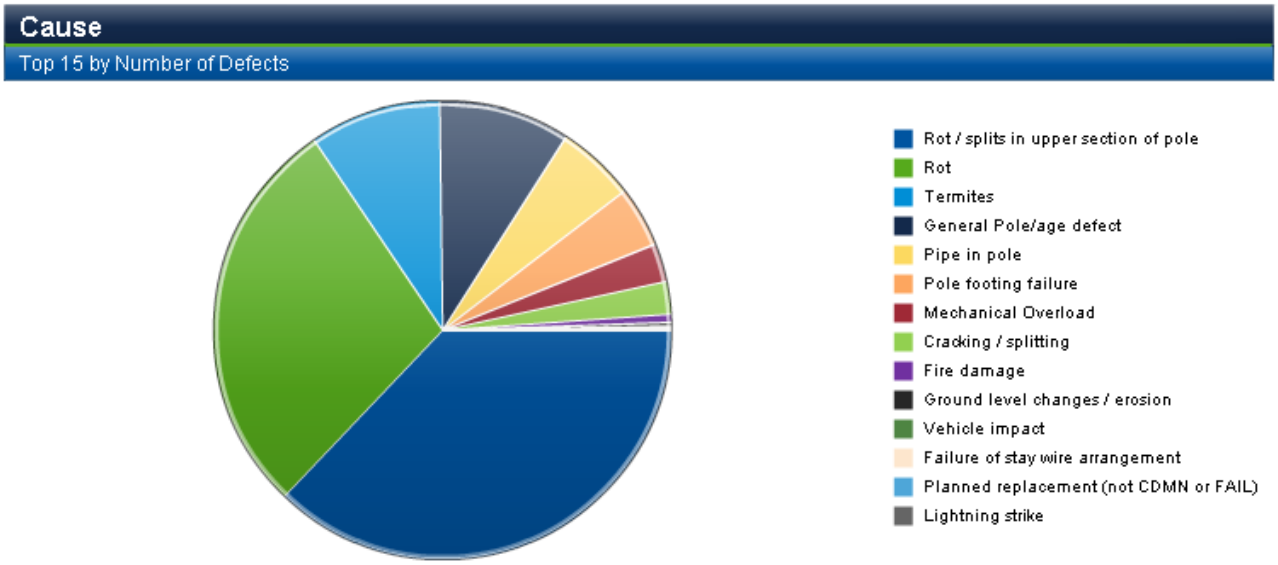


Figure 12 – Wood pole population – top 15 causes of failure (by incidence) addressed by replacement

The top three causes are:

- Rot/splits in the upper section.
- Rot below ground.
- Termites.

Metal poles/concrete poles

The failure cause data shown in Figure 13 and Figure 14 is from Ausgrid's Corporate Asset Investment Outcomes dashboard. The data includes both breakdown and corrective failure notifications associated with all metal and concrete poles.

Metal poles

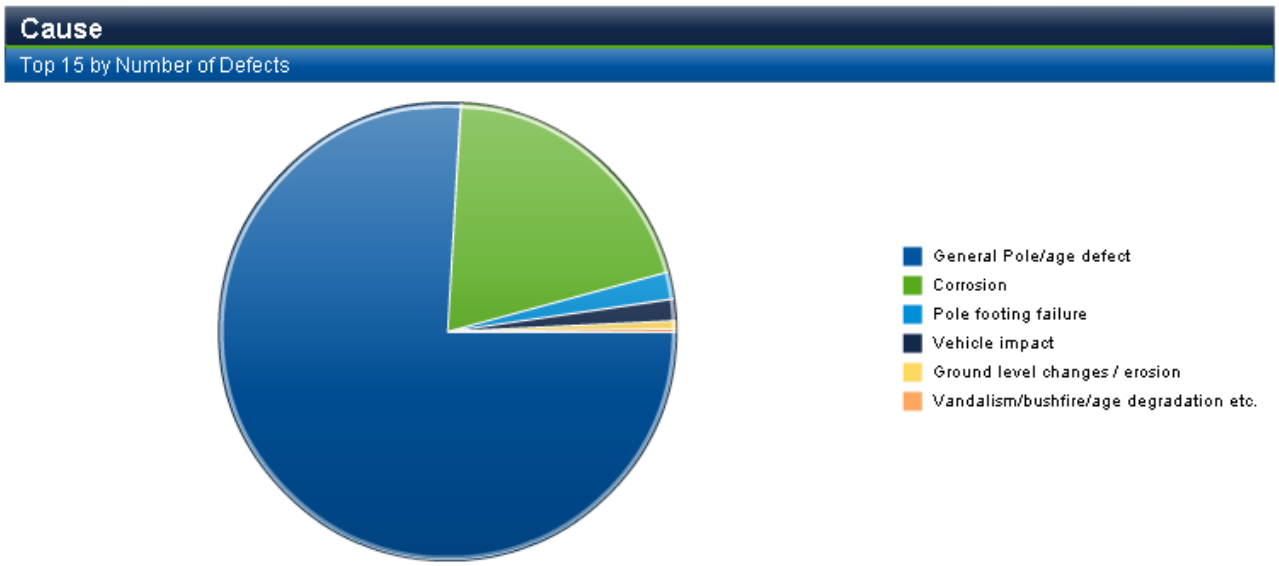


Figure 13 – Metal pole population – top 15 causes of failure (by incidence) addressed by replacement

The top three causes are:

- General age/deterioration.

- Corrosion.
- Footing failure.

Concrete poles

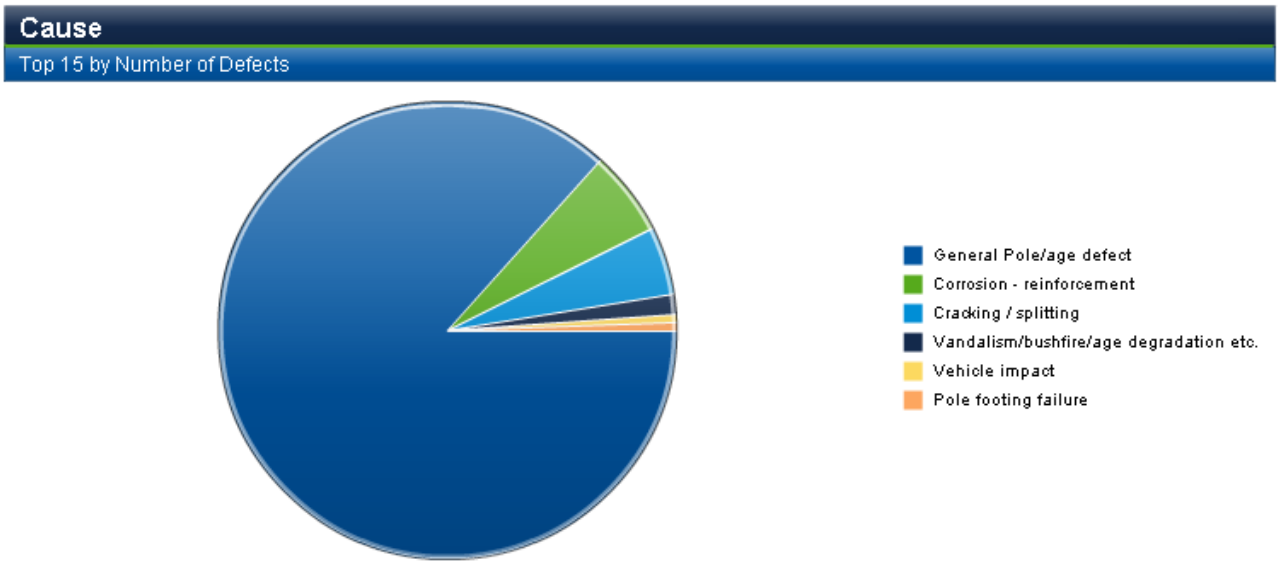


Figure 14 – Concrete pole population – top 15 causes of failure (by incidence) addressed by replacement

The top three causes are:

- General age/deterioration.
- Corrosion.
- Cracking/splitting.

Nailed timber poles

The failure cause data shown in Figure 15 is from Ausgrid's Corporate Asset Investment Outcomes dashboard. The data includes both breakdown and corrective failure notifications associated with all timber nailed poles.

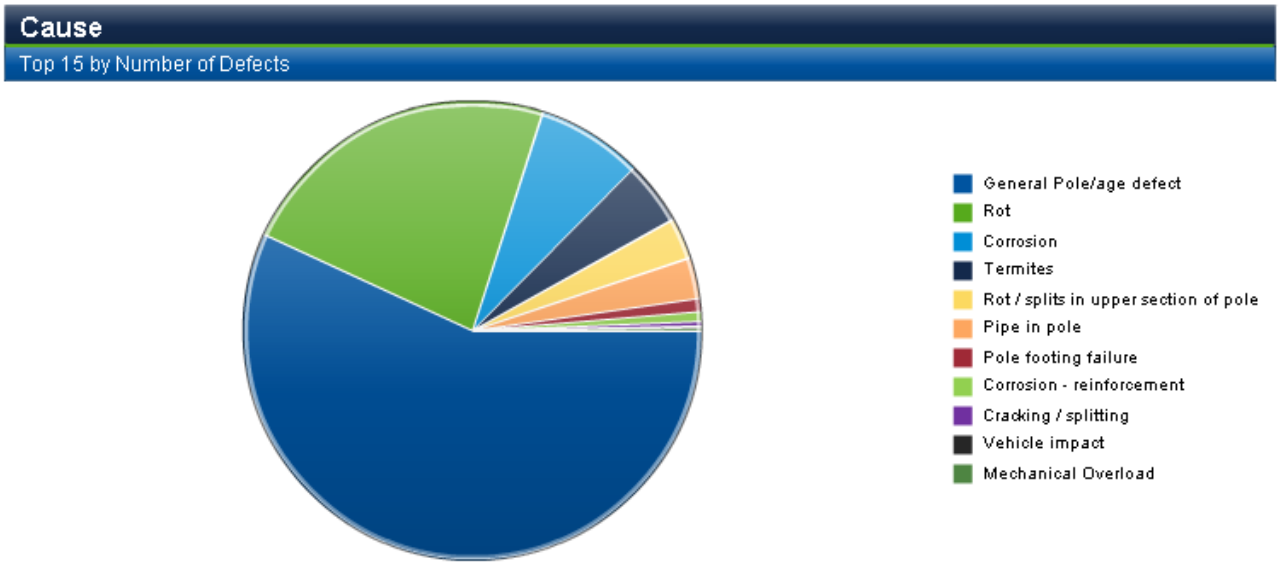


Figure 15 – Timber nailed pole population – top 15 causes of failure (by incidence) addressed by replacement

The top three causes are:

- General age/deterioration.
- Rot.
- Corrosion of the nail.

3.2.2. Breakdown failures

The factors described above are the primary condition drivers that lead to an asset being replaced, as it no longer meets Ausgrid's technical specification to remain in service. In addition, Ausgrid also experiences a number of breakdown failures associated with these assets. Such failures occur as a result of extensive degradation where the asset fails to support the overhead network and falls to the ground. Owing to the nature of the asset, being embedded throughout the community in streets, parks, reserves, bushland and private property, and as they are generally supporting live, exposed mains and apparatus, the breakdown failure of a pole is an event to be avoided.

Over the past three years (FY2009/10 to FY2011/12), Ausgrid has experienced the following breakdown failures associated with poles.

Breakdown pole failures over time				
2009/10	**2010/11**	**2011/12**	**Total**	**Average**
13	11	9	33	11

Figure 16 shows the typical results of severe degradation, in this case caused by termites, leading to a full function failure of the pole. A full failure means the pole falls to the ground. In this case the pole has fallen on to a vehicle in a suburban street.

Figure 16 – The result of a breakdown failure of a wood pole caused by a combination of termite attack and rot

As part of its ongoing management approach to this group of assets, Ausgrid has been actively seeking to reduce the number of breakdown failures within this asset class, due to the inherent safety risks caused by poles falling and bringing down live mains and other equipment. Through a combination of maintenance and replacement strategies, Ausgrid has had a meaningful impact on the number of failures over time, as shown in Figure 17 below.

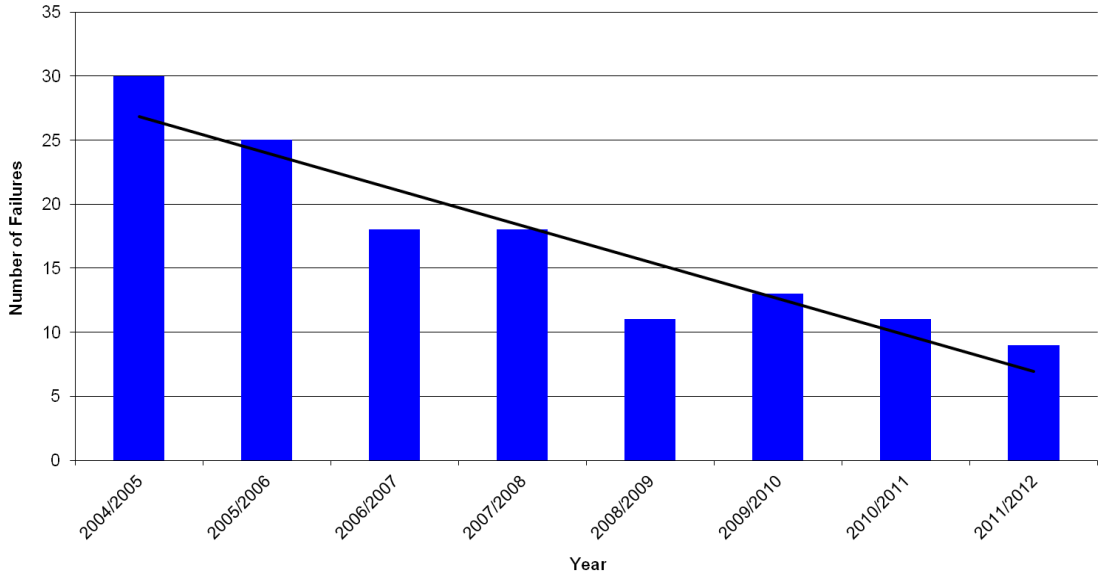


Figure 17 – Ausgrid's historical pole failures, per year

The number of failures detailed above across all types of poles, including dedicated street lighting poles, is shown as a comparative performance measure year on year. When applied to the equivalent population of poles on the network, i.e. including street lighting poles and columns, Ausgrid is currently experiencing 0.18 failures per 10,000 poles, per year. This number of failures is well below the industry benchmark of one failure per 10,000 poles, per year, although it sits above the aspirational target of 0.1 failures per 10,000 poles, per year[2].

It is worth noting that while the performance of the asset in broad terms is considered to be in line with industry best practice, the risks associated with pole breakdown failures and the embedded nature of those assets are such that all breakdown failures should be avoided wherever possible. However, given the large population of poles (over 500,000 on the Ausgrid network), it would be unrealistic to assume that a complete elimination of all breakdown failures is possible. Similarly, it would also be unacceptable – from a business, community and regulatory risk perspective – to allow poles to fall to the ground routinely, and to rectify these failures in a purely reactive manner, despite this being the least cost replacement alternative. Put simply, the risks associated with breakdown failures are too great to adopt a 'run to failure' strategy.

Ausgrid has a low incidence of breakdown failures of poles, largely due to the effectiveness of the inspection and testing program which identifies condition issues prior to a pole failing completely. Of the small number of poles that do fall, the vast majority of failures are caused by termites, rot and fungal decay (in the case of wood poles), or rust in the case of steel poles. This is illustrated in Figure 18.

[2] Department of Consumer and Employment Protection Government of Western Australia -WESTERN POWER'S WOOD POLE MANAGEMENT SYSTEMS: REGULATORY COMPLIANCE AUDIT 2005 -EXECUTIVE SUMMARY citing Electricity Council of NSW guide EC8 -1994

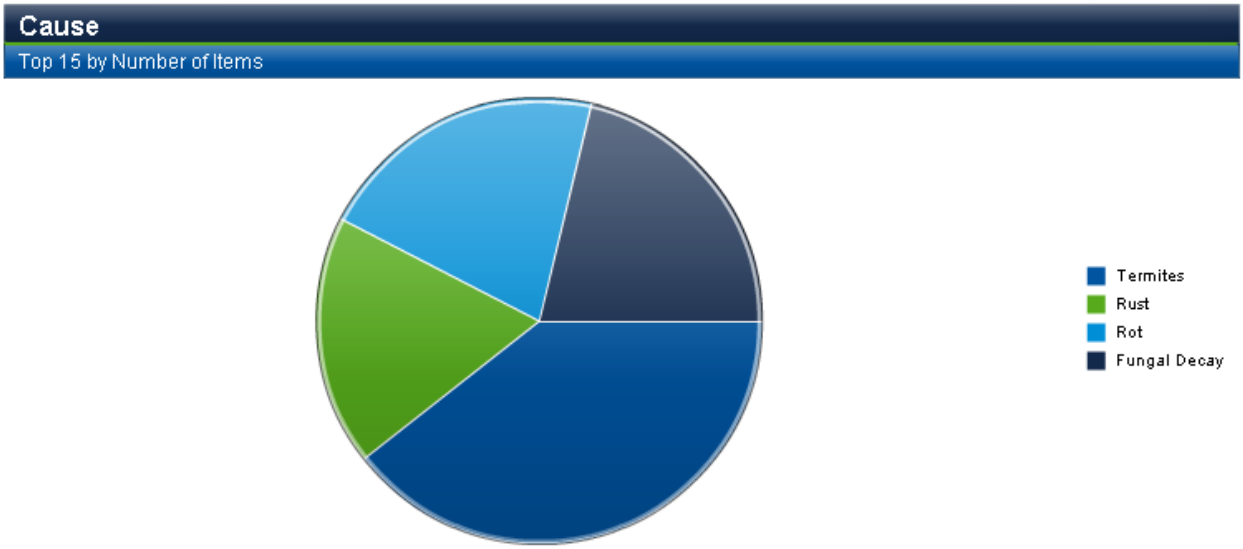


Figure 18 – Pole population – top 15 causes of functional failure (by incidence)

4. Other Investigations/Plans

4.1. Current Investigations

Poles are a long lived asset, anticipated to remain in service for between 25 and 65 years. As such, any investigation into the life of the asset and any conclusions about the effect of asset age on current and future replacement strategies and forecasting, must be developed over a significant timeframe to achieve meaningful outcomes.

Ausgrid and its predecessor organisations have been actively involved in investigations into the performance of pole structures for over 20 years. As part of Ausgrid's ongoing development, a number of trials have been, or are being, undertaken in the following areas:

- Ongoing investigation into timber preservative and termite treatment methods to enhance the serviceable lives of these assets.
- Ongoing investigation into reinforcing and other life extension options, thus deferring the capital replacement.
- Investigation into alternative pole construction materials, such as modern day 'composite' poles, with potential OPEX savings and enhanced asset performance characteristics including life expectancy. There is also a particular focus on harsh/difficult environments such as bushfire prone areas and marine/tidal environments when considering an asset's performance and life expectancy. 'Titan' poles, evaluated as a potential replacement alternative in the risk reduction options evaluated under section 6.2, are one such composite material being considered.

Ausgrid is also an active participant in industry forums and research opportunities with other bodies such as the Energy Networks Association and the CSIRO, to better understand the behaviour characteristics of pole support structures, their inspection and serviceable lives.

5. Risk Assessment

5.1. Consequences of Asset Failure

Poles can fall for a number of reasons. The consequence of a pole support structure failure will vary depending on location, pole type, construction, voltage and the type and amount of equipment installed. However, because of the construction type of OH mains, and the location of the assets being primarily located in publicly accessible lands that are immediately adjacent to roadways in both residential and commercial areas, the consequences of failure are almost always significant.

The consequences of failure include:

- Equipment falling to ground.
- Fire, including bushfire.
- Electrical arc/flash burns.
- Pedestrian injury/fatality.
- Traffic disruption/injury/fatality.
- Adverse media attention.
- Potential or actual contact with live wires.
- Oil loss and environmental damage from pole mounted equipment.
- Loss of supply to a widely distributed area or critical supply e.g. hospitals.

The consequence inputs into the Replacement Program Risk Quantification Model are summarised in Table 10 and Table 11 below. The consequence severity levels are as defined in Figure 6.7 of the *Maintenance Requirements Analysis Manual* (AM-STG-10005).

Due to the variety of configurations of poles on the network, the Risk Quantification Model inputs below are based on distribution poles in a bushfire area, as they represent the vast majority of the poles on the network.

Table 10 – Risk Quantification Model Inputs

	Safety	Environmental	Damages/liability	Adverse publicity
Consequence level	3 – Moderate (Note 1)	1 – Insignificant (Note 2)	2 – Minor - (Note 3)	2 – Minor - (Note 4)
Probability of outcome upon functional failure	10%	1%	20%	1%

Notes:

1. *Consequence level of Moderate refers to a serious injury requiring medical attention. This includes sustaining an electrical shock or electrical burns by Ausgrid staff or the general public, due to a functional failure of the pole which brings live mains and equipment to the ground, generates a mechanical impact, contains the presence of high voltage and produces a risk to both the public and worker safety. The moderate level also considers that the assets are geographically dispersed and physically embedded throughout the community.*
2. *Consequence level of Insignificant refers to a near miss, as the risk of environmental damage is primarily associated with minimal oil filled equipment, that represents a small population of poles, when poles with pole mounted transformers are excluded.*
3. *Consequence level of Minor refers to damages/liability ranging from $100,000 to $1,000,000 for litigation associated with personal injury/death or property damage, resulting from either contact with mains or fire initiated from asset failure.*

4. *Consequence level of Minor - adverse publicity including Adverse Local Media Attention & Multiple Major Customer Enquiries associated with functional failures.*

Table 11 – Risk Quantification Model Inputs – supply consequences

	Supply
Individual asset load at risk (MVA)	8.07
Probability of load loss upon functional failure	100%
Average time to repair	8 hrs
Average time to restore load	6 hrs

5.2. Probability of Asset Failure

Between July 2009 and June 2012 there were a combined 21,512 conditional failures raised for poles. This represents approximately 140 corrective failures per 10,000 poles, per year.

Additionally, between July 2009 and June 2012 there were a combined 33 functional failures raised for poles. This represents approximately 0.21 breakdown failures per 10,000 poles, per year.

5.3. Risk Matrix

While the precise nature of the risk associated with each option will vary according to the condition and location of the pole, the risk of the likely failures has been established in Table 12.

5.3.1. Risk level – corrective and breakdown failures

Table 12 – Existing risk levels for poles corrective and breakdown failure risk levels

Steel mains/ACSR failure	Hazard	Likelihood	Consequence	Risk
Catastrophic failure of the pole due to rot, termites or other driver	Electric shock leading to injury, electrocution/fatality of Ausgrid employee or member of the general public due to fallen conductors(Note:1)	Unlikely	Catastrophic	**D5**
Catastrophic failure of the pole due to rot, termites or other driver	Bushfire risk caused from fallen assets	Unlikely	Catastrophic	**D5**
Catastrophic failure of the pole due to rot, termites or other driver	Mechanical Impact (Note:1)	Unlikely	Major	**D4**
Failure of the pole due to rot, termites or other driver	Mechanical Impact, electrical hazard and fire risk (Note:3)	Possible	Moderate	**C3**
Failure of the nail	Mechanical impact and electrical hazard	Unlikely	Minor	**D2**

Notes:

1. *Catastrophic failures of the pole due to any driver are rare due to the combined asset management strategy employed by Ausgrid, which includes a comprehensive inspection and testing maintenance program and preventative maintenance program. Nonetheless, a limited number of failures do occur, so the risk has been considered.*
2. *Failure of the pole, leading to a combination of likelihood and consequence of mechanical impact and electrical hazard or possible and moderate, are considered to be representative of the vast majority of failures on the Ausgrid network, due to the combined maintenance and replacement strategies for this asset.*

5.3.2. Risk driver identification

Approximately 20 percent of Ausgrid's OH network is located in bushfire prone lands, as defined by the Commissioner of the RFS[3], and this factor is one of the top operational and consequence risks to the network. The other general inherent risks involved in owning and operating a large, distributed network, particularly a network dominated by OH construction such as Ausgrid's, means that Ausgrid has a critical obligation to maintain the condition of its pole support structures. This ultimately means the pole support structures must be capable of meeting their primary objective of keeping the OH network in the air.

Ausgrid has an obligation to ensure a safe and reliable system of supply for its customers, its workers and the community in general. Electricity supply networks are an essential part of the infrastructure supporting the Australian community. Electricity supply networks differ from many other essential facilities in that they are physically embedded throughout the community (in publicly accessible areas), making network safety essential for both utility business employees who work in and on networks, and for the community. In addition, continuity of electricity supply is essential for those reliant on life support systems and for the avoidance of death and injury during extreme weather events[4].

Ausgrid's pole population is ageing, and without significant and continued investment including inspection, maintenance, reinforcement and replacement, the risk posed to all affected parties (customers, workers and the community) will increase over time. There are a number of statutory requirements that relate to the performance of a pole and its ability to maintain the overhead network in a spatial location. If the pole cannot meet these fundamental requirements, then the following obligations may not be fulfilled:

- Minimum clearances to ground and other obstructions such as buildings/balconies, etc.
- Minimum clearances across roads and driveways and routinely traversed locations.
- Vertical alignment, in relation to roadways, of the pole structure itself.
- Vertical and horizontal clearances between electrical circuits.
- Clearances to vegetation.

The following risk drivers are applicable to poles of all types:

- **Asset Performance** – degradation of supporting assets (poles) which have a function to maintain the safety and reliability of the OH network. Increasing failure rates due to degradation of the poles, if not managed appropriately, will lead to an unsustainable level of risk.
- **Duty of Care** – Minimise the risk of electrical shocks/electrocution, mechanical impact and bushfire due to pole failure.
- **Compliance** – Ensuring that the Ausgrid distribution network provides a safe supply of electricity in accordance with Electricity Supply (Safety and Network Management) Regulation 2008.

[3] Each year Ausgrid receives information on bushfire prone land from the Rural Fire Service of NSW, which is incorporated into the Ausgrid GIS for use in planning and operational activities.
[4] Excerpt from Draft Australian Standard-AS5577 Electricity network safety management system.

6. Risk Reduction Options Analysis

6.1. Risk Reduction Options

As discussed in section 2, there are over 513,000 pole support structures on the network embedded throughout the community. A number of options have been considered to reduce the risk of these assets failing. In assessing these options, Ausgrid has considered industry guides and standards such as DOC 017-2008 ENA Industry Guideline regarding the inspection, assessment and maintenance of overhead power lines. Ausgrid utilises these guidelines to provide the benchmark standard and to identify the available options for reducing the risks associated with this asset type. Options considered include:

6.1.1. Option 1 – Do nothing (run to failure)

This approach assumes that no inspection, corrective or preventative maintenance will be conducted, and that the assets will be managed by a purely reactive program following breakdown failure.

6.1.2. Option 2 – Age based proactive nailing (life extension)

The proactive nailing of older OH support structures would provide a level of risk reduction that is dependent on the scale of the program. Assuming a healthy network, it could be argued that a systematic program of proactive nailing could go some way to managing the risk of failure, for a relatively minor cost when compared to the proactive replacement of poles. This would occur if sufficient levels of reinforcement were to take place year on year. The current average age of Ausgrid's pole support structures, at approximately 32.9 years, is well above the healthy state of 22.5 years. Given Ausgrid's current population of OH pole support structures and an average standard life of 45 years, a healthy network would require approximately 11,400 pole nailing tasks to be undertaken per year, assuming that the oldest assets are nailed. Technical constraints, however, mean that not all poles are suitable for nailing. Historically, approximately 50 percent of poles that are found to be defective are suitable for nailing. This approach has the disadvantage of not being targeted based on condition. A targeted program would aim to address identified and quantified risk via an inspection program.

6.1.3. Option 3 – Age based proactive replacement

As for Option 2, the proactive replacement of older OH support structures would provide a level of risk reduction that is dependent on the scale of the program. Like Option 2, age based replacement has the disadvantage of not being targeted based on condition .

6.1.4. Option 4 – Nailing (life extension modification) following corrective failure

Following inspection and testing each year, a number of poles are determined to have experienced a corrective failure, as they no longer meet the criteria to remain in service as documented in Ausgrid's *Network Standard – NS 145 Inspection and Treatment Procedures* (June 2011).

Ausgrid's policy is to nail defective poles wherever it is technically and economically feasible. For the purposes of economic modelling, it is assumed that the historical rate of nailing (approximately 50 percent of defective poles) will continue. Further, it is anticipated that the reinforcement will provide a 12-year life extension (on average) for the pole from the time of reinforcement. This will effectively defer the capital replacement costs for the same period, after which time the pole will be replaced (12-year anticipated replacement). Only where nailing is not possible will pole replacement be undertaken to address the risks posed by these assets.

This option also allows for a transition from uncontrolled failures to controlled failures within the engineered support structure if functional failures occur in the future.

6.1.5. Option 5 – Replacement following corrective failure

Failed poles that are not suitable for nailing for technical, financial or operational reasons must be replaced to address the safety risks posed by these assets. Generally there are two decision options in these cases: to replace like for like, or to replace with a new technology option. These two cases are examined below.

Option 5a – Replacement (like for like)

Generally Ausgrid replaces OH support structures on a like for like basis. i.e. following technical failure, the pole is replaced with a new structure of a modern equivalent type, size and rating, where available. Where a situation indicates that a new technology may be beneficial and would provide improved performance outcomes, this may be considered.

Option 5b – Replacement (new technology)

New replacement technology options are considered when the technical specification of the existing pole structures are no longer considered suitable, when the operating environment has changed, requiring an alternative design criteria to be satisfied or when a change to a new technology (including material construction type) may provide improved service performance and/or reduced OPEX obligations.

6.2. Options Costing

The NPV model was used to compare costs associated with the various options based on a single unit replacement. The cost assumptions used to calculate the risk costs of the various options in the model were:

- The consequence of failure cost, as per the Risk Quantification Model, was $474,820.00.
- The planned replacement cost was $10,700.00 (on average) across all pole types and sizes. No reactive mark-up was applied.
- The average age of the population and the average replacement age were used to determine the timing of initial and repeat failures.
- An average life extension of 12 years was assumed for nailing, at an average cost of $830.00.
- Maintenance costs were obtained based on system averages for these tasks, as per the OPEX dashboard extract, which saw line inspections cost $55.61 and pole inspections cost $93.32. There is an assumed inspection rate for Titan poles which equals $50.00.

The cost of Option 1 included:

- The calculated costs of functional failure, incurred at the average replacement life of 33.37 years, is $474,820.00
- A repeat failure, and calculated costs of failure, based on the average replacement life of 33.37 years is at a cost of $474,820.00.
- Inspection costs were not included as this is a 'run to failure' strategy.

The cost of Option 2 included:

- An initial repair (nail) based on aged assets at a cost of $830.00.
- A probable cost of failure based on a reduced risk cost of $464,373.00, representing a 2.222% reduction in risk, based on a program to address risk on an average 45 year life for poles.
- The replacement of the pole, based on an average life extension of 12 years is $10,700.00.

- Full calculated cost of failure, based on the average age of replacement of 33.37 years, is at a cost of $474,820.00.

The cost of Option 3 included:

- An initial replace based on aged assets at a cost of $10,700.00.
- A probable cost of failure based on a reduced risk cost of $464,373.00, representing a 2.222% reduction in risk, based on a program to address risk on an average 45 year life for poles.
- The replacement of the pole, based on an average life extension of 12 years is $10,700.00.
- Full calculated cost of failure, based on the average age of replacement of 33.37 years, is at a cost of $474,820.00.

The cost of Option 4 included:

- Costs associated with the periodic inspection of overhead lines every five years.
- Costs associated with the periodic inspection of poles every five years.
- Inspection costs derived from system averages with line inspection costs at $55.61 and pole inspection costs at $93.32.
- A condition based nailing of the pole at a cost of $830.00, thus avoiding breakdown failure.
- Planned replacement of the pole at a cost of $10,700.00, following a 12-year average life extension.
- A condition based nailing of the pole at a cost of $830.00, avoiding breakdown failure after 33.37 years, based on the average age of replacement.

The cost of Option 5a included:

- Costs associated with the periodic inspection of overhead lines every five years.
- Costs associated with the periodic inspection of poles every five years.
- Inspection costs derived from system averages, with line inspection costs at $55.61 and pole inspection costs at $93.32.
- A condition based replacement of the pole, at a cost of $10,700.00, thus avoiding breakdown failure.
- A condition based replacement of the pole, at a cost of $10,700.00, avoiding breakdown failure after 33.37 years, based on the average age of replacement.

The cost of Option 5b included:

- Costs associated with the periodic inspection of overhead lines every five years.
- Costs associated with the periodic inspection of poles every five years.
- Inspection costs derived from system averages, with line inspection costs at $55.61 and pole inspection costs at $93.32.
- A condition based replacement of the pole, at a cost of $11,228.60 using a Titan pole, thus avoiding breakdown failure.
- A condition based replacement of the pole with a Titan pole, at a cost of $11,228.60, avoiding breakdown failure after 33.37 years, based on the average age of replacement.

6.3. Risk Assessment of Options

6.3.1. Option 1 – Do nothing (run to failure)

This option is not considered viable, given the level of risk posed to the community and Ausgrid personnel in the event of failure. Ausgrid experiences an average of 7,181 failures of all types per year under the current inspection testing, maintenance and replacement regime. If a purely reactive strategy were to be adopted, the failure rates and the level of risk posed to the community would increase to an unacceptable level.

6.3.2. Option 2 – Age based proactive nailing (life extension)

The risk posed by this group of assets is not adequately addressed by an age based program. Probable risk reduction is not as significant as it would be under a targeted program, based on a detailed condition assessment. This option is considered to be suboptimal, both economically and technically.

6.3.3. Option 3 – Age based proactive replacement

As for Option 2.

6.3.4. Option 4 – Nailing (life extension modification) following conditional failure

The outcome of the NPV analysis for this option meets the economic requirements for the business, while also satisfying the technical requirements. Nailing is the preferred economic option as both nailing and replacement follow identification via a condition based inspection program, which satisfactorily addresses the safety risk. If circumstances allow, reinforcement is the preferred method over replacement.

Option 5a – Replacement following conditional failure (like for like)

Replacement on a like for like basis is considered only where nailing is neither technically nor economically prudent. In most cases the decision to replace is based on technical considerations that preclude nailing. A like for like replacement using the modern equivalent is the next preferred economic option, as it satisfies the technical requirements at the next lowest cost.

Option 5b – Replacement following conditional failure (new technology)

Replacement with new technology (e.g. Titan pole), is only considered when nailing is neither technically nor economically prudent and in circumstances where environmental, access, terrain or bushfire performance are identified as critical elements. The NPV analysis shows that, for a marginal increase in initial investment, improved performance characteristics can be acquired for such situations. This is based on the current average lifecycle time for the existing population. Should the Titan poles also achieve their forecast lives, anticipated to be well in excess of traditional poles, then this margin will reduce further or may even be eliminated. This makes replacement with a Titan pole particularly suitable for selection as a replacement alternative in bushfire prone areas, difficult terrain and marine environments.

Table 12 below details the likely risk reduction that would be achieved by each of the options outline above if they were to be adopted.

Table 13 – Investment option residual risk

Existing risk				Risk after option applied		
Option	Likelihood	Consequence	Risk	Likelihood	Consequence	Risk
Do nothing (run to failure)	Unlikely	Catastrophic	**D5**	Unlikely	Catastrophic	**D5**
Age based nailing	Possible	Moderate	**C3**	Possible	Moderate	**C3**
Age based replacement	Possible	Moderate	**C3**	Possible	Moderate	**C3**
Condition based nailing	Possible	Moderate	**C3**	Unlikely	Minor	**D2**
Condition based replacement (like for like)	Possible	Moderate	**C3**	Unlikely	Moderate	**D3**
Condition based replacement (new technology	Possible	Moderate	**C3**	Unlikely	Moderate	**D3**

6.4. Cost Benefit Analysis of Options

6.4.1. NPV analysis

Table 14 indicates that the recommended option is Option 4 – Nailing (life extension modification) following conditional failure. This option provides the required level of risk mitigation at the lowest cost for managing pole failures. This is primarily driven by avoiding the cost of failure and associated consequences, through the timely assessment of condition and remedial actions. The relative advantages of the various options have also been assessed and are shown in Table 15.

Table 14 – NPV Analysis[5]

Option	NPV		
	Discount Rate - 2%	**Discount Rate**	Discount Rate + 2%
Run to Failure	$ (911,410.53)	$ (880,205.13)	$ (856,885.72)
Planned Reinforcement Non-conditional	$ (444,999.82)	$ (429,841.59)	$ (419,060.07)
Planned Replacement Non - conditional	$ (475,214.82)	$ (451,107.43)	$ (434,870.19)
Planned Reinforcement On condition (12 year hard time Replace Like for Like)	$ (5,265.89)	$ (4,285.16)	$ (3,531.54)
Planned Replacement On Condition (Like for Like)	$ (11,658.34)	$ (11,025.31)	$ (10,593.13)
Planned Reinforcement On condition (12 year hard time Replace New technology - Titan Pole)	$ (5,380.85)	$ (4,392.25)	$ (3,623.70)
Planned Replacement On condition (New technology - Titan Pole)	$ (11,133.46)	$ (10,911.07)	$ (10,702.00)
			Using current Discount Rate
According to this analysis, the recommended option to take is			$ (4,285.16)
	This option is highlighted in green.		
			Using Discount Rate + 2%
According to this analysis, the recommended option to take is			$ (3,531.54)
	This option is highlighted in light green.		
			Using Discount Rate - 2%
According to this analysis, the recommended option to take is			$ (5,265.89)
	This option is highlighted in light green.		

Notes:

1. *Refer to section 6.2 for the costs associated with this economic evaluation.*
2. *The NPV model output shown above is extracted from the NPV model titled "NPV Spreadsheet - 20140321 Condemned Poles FINAL March 2014.xlsm".*
3. *The model uses a discount rate of 10 percent. Discount rates of 8 percent and 12 percent are also shown for comparison.*

Table 15 – NPV outcomes

Option	Advantage	Disadvantage
1. Do nothing (run to failure)	Least expenditure required of all alternative programs.	Remedial actions only deal with the current condition issues of the poles impacted. Reactive costs for switching and staff will be required for reactive replacement. Failures of poles would be expected to increase, i.e.

[5] Ref: MOI\AER_Submissions\2014\Mains Working Files\NPV Spreadsheet\NPV Spreadsheet - 20120711 Condemned Poles v2 Nov 12.xlsm.

Option	Advantage	Disadvantage
		more poles falling over, largely in public spaces. Failures increase the likelihood of a significant incident, particularly where a combination of risk drivers are present. The number of conditional and functional failures will increase as the average age of the asset increases, although conditional failures will remain hidden. Safety and bushfire risks associated with these failures will also increase. This strategy does not manage the increasing average age of the population. This strategy is not sustainable.
2. Age based nailing	This strategy is based on the age of installation. Program development is therefore relatively easy as it is based on age information. Cheaper than replacement.	Age based nailing does not consider the actual condition of the assets to be replaced. Some assets will be nailed prematurely leading to a suboptimal outcome for the network in terms of cost. At the same time, poles that may have significant conditional issues, may in fact be left in service unsupported, which makes them degrade further, even to the point of functional failure, while older poles are being nailed. Failures are expected to increase as the assets are not being nailed on current condition information following assessment.
3. Age based replacement	This strategy is based on the age of installation. Program development is therefore relatively easy as it is based on age information. This strategy may reduce the average age of the asset group to a sustainable replacement level over many years, if the oldest assets are replaced at suitable levels.	Age based replacement does not consider the actual condition of the assets to be replaced. Some assets will be replaced prematurely leading to a suboptimal outcome for the network in terms of maximising serviceable life. At the same time, poles that may have significant conditional issues, may in fact be left in service, which makes them degrade further, even to the point of functional failure, while older poles are being replaced. Failures are expected to increase as the assets are not being replaced on current condition information following assessment. More expensive than nailing.
4. Condition based nailing	Addresses both the corrective and breakdown failure issues associated with poles. Detailed condition assessment means only those assets that require remedial actions are addressed. Cheaper than replacement. Fifteen year life extension achievable on average. Deferred capital investment. Reduction of safety risk associated with failed poles. If functional failures occur in the future, a transition from uncontrolled failures to controlled failures exists within the engineered support structure.	Requires pole to be in a sound condition and technically suitable for replacement. Life extension of 12 years is not an ‘as new’ fix and will require replacement at a later stage.
5a. Condition based replacement (like for like)	Addresses both the corrective and breakdown failure issues associated with poles. Detailed condition assessment means only those assets that require remedial actions are addressed.	More expensive than nailing. Capital investment is required much earlier than nailing. Technology still susceptible to environmental conditions such as termites and rot.

Option	Advantage	Disadvantage
	Provides an 'as new' outcome. Forty-five year standard life expectancy. Reduction of safety risk associated with failed poles. Planned replacement assists effective allocation of constrained planning, design and project delivery resources. Planned replacements allow pole replacements to be methodical and efficient. Methodical replacement practices have a low impact on the community as work consultation and notification can be implemented. Methodical replacement means resources can be efficiently allocated to prevent repeated future interruptions to these areas. Planned replacement will expedite a reduction of safety risk associated with failed poles.	
5b. Condition based replacement (new technology)	Addresses both the corrective and breakdown failure issues associated with poles. Detailed condition assessment means only those assets that require remedial actions are addressed. Provides an 'as new' outcome. Less susceptible to environmental conditions. Forty-five year standard life expectancy. Reduction of safety risk associated with failed poles. Planned replacement assists effective allocation of constrained planning, design and project delivery resources. Planned replacements allow pole replacements to be methodical and efficient. Methodical replacement practices have a low impact on the community as works consultation and notification can be implemented. Methodical replacement means resources can be efficiently allocated to prevent repeated future interruptions to these areas. Planned replacement will expedite a reduction of safety risk associated with failed poles. Reduced Opex via new technology.	More expensive than nailing, and like for like replacement. Capital investment is required much earlier than nailing.

6.5. Preferred Option

The option that provides the required level of risk mitigation at the lowest cost for this group of assets is Option 4 – Condition based nailing, followed by a 12-year (on average) like for like replacement. This solution will be adopted as a guiding principle, and executed where possible.

Where planned reinforcement cannot be undertaken for technical, financial or operational reasons, planned replacement is the next preferred option. Based on the analysis of pole nailing rates in section 3.2.1 this will occur in approximately 50% of cases.

Owing to the relatively small differences in NPV (one to two percent) between like for like replacement and replacement with new technology (Titan poles), replacement with either type is prudent. However, there is a preference (subject to ongoing trials and competitive market availability) for new technology poles to be installed in bushfire prone areas, due to their superior performance and reduced risk of failure under such conditions.

7. Current Program Summary

Ausgrid has a long standing replacement program for poles of all types and voltages across the network. The current program is based on detailed analysis of the needs of the business and is driven by condition information obtained through inspection and testing. Detailed criteria on serviceability limits, as well as inspection and testing requirements, are documented in Ausgrid's network standards, specifically NS 145.

The current program has been very successful in addressing the risks posed by these assets across Ausgrid's large, geographically dispersed network. As noted in the discussion on failures, Ausgrid has experienced approximately 7,181 failures on average per year, over the past three years. The poles that were able to be nailed represent the best financial outcome while still addressing the risks. Those assets that were not suitable for nailing then became part of the replacement plan. A summary of the current replacement plans for poles is shown in Table 15.

Table 16 – Summary of current pole replacement programs

Reg ID		09/10	10/11	11/12	12/13	13/14
REP_04.02.02 Pole Replacement DMOH	$	42,608,084	38,347,956	38,066,220	57,033,762	61,869,775
REP_05.02.06 Poe Repacement TMOH	$	4,103,929	5,369,323	5,635,937	4,874,288	5,000,000
Total $000	$	**49,138**	**44,838**	**43,702**	**61,908**	**66,870**

On average, approximately 50 percent of the poles that are found to be defective are nailed, and the remainder are replaced. Detailed information on the current program is tracked and reported every month via performance and operations reports, which provide Ausgrid with an excellent opportunity to understand both the progress of the current programs and also use this information as a valuable tool to inform and shape our future programs of work. The programs of work detailed in this document have been developed on the basis of the current programs, and are an extension of the programs undertaken in this period to address the risks.

8. Proposed Program

8.1. Program, Timing and Development

The proposed timing of the program is based on the forecast corrective failure rates anticipated over the next regulatory period and is based on the historical defect rates experienced to date. Poles deteriorate over time due to a number of environmental factors, eventually requiring some remedial action, such as nailing or eventual replacement.

Ausgrid has monitored the current and previous pole replacement and inspection programs and used this historical performance information to project the forward requirements for replacement and nailing, based on condition. As poles are found to be defective, they are programmed for remedial action, based on priority and severity of defect.

An overview of the historical information and forecast is provided in the next section. The nature of this program dictates the timing and quantities of replacement and nailing required to address the identified risks. Through appropriate forecasting of historical performance, Ausgrid aims to establish the required quantities and timing of works as accurately as possible; however, year on year variances may occur when specific condition issues are encountered that may change the program profile. Where nailing is technically suitable, capital replacement may be deferred by an average of 12 years. This effectively restores the ground line strength of the pole to a suitable level via the reinforcing structure. Where nailing is not suitable, replacement must occur without delay.

The outputs of the risk quantification Model provide the following risk mitigated/cost ratios:

Transmission Pole replacement 39.65

Distribution Pole Replacement 115.78

8.2. Planning and Cost Assumptions

In conjunction with the economic analysis of the options for each sub-group program, the following points have been considered in determining program delivery through planned replacement:

- Historical failure data, including consideration of the historical and projected defect rate, following conditional assessment.
- Inspection frequency.
- Asset population data.
- Age profile and anticipated end of life extension capabilities of existing reinforcements – 12 years.
- Legislative requirements.
- Asset management philosophy as outlined in the Ausgrid Maintenance Requirements Analysis Manual.
- Consideration of the need to develop long-term sustainable asset management, maintenance and replacement strategies and outcomes.

The historical failure data was examined in detail throughout section 3.2. In a more general sense, the trend in corrective failures detected via the inspection programs provides an indication of the likely future needs of the business in terms of the replacement quantities required.

Ausgrid's preferred option is to reinforce wherever possible, in order to realise the life extension benefit provided by this low cost solution. The following data and information is based on the historical percentage and numbers of poles that have been replaced, and those that are projected

to require replacement, as they are not suitable for reinforcement. Figure 19 shows the historical percentage of poles found to be defective and requiring replacement between FY2005/06 and FY2011/12.

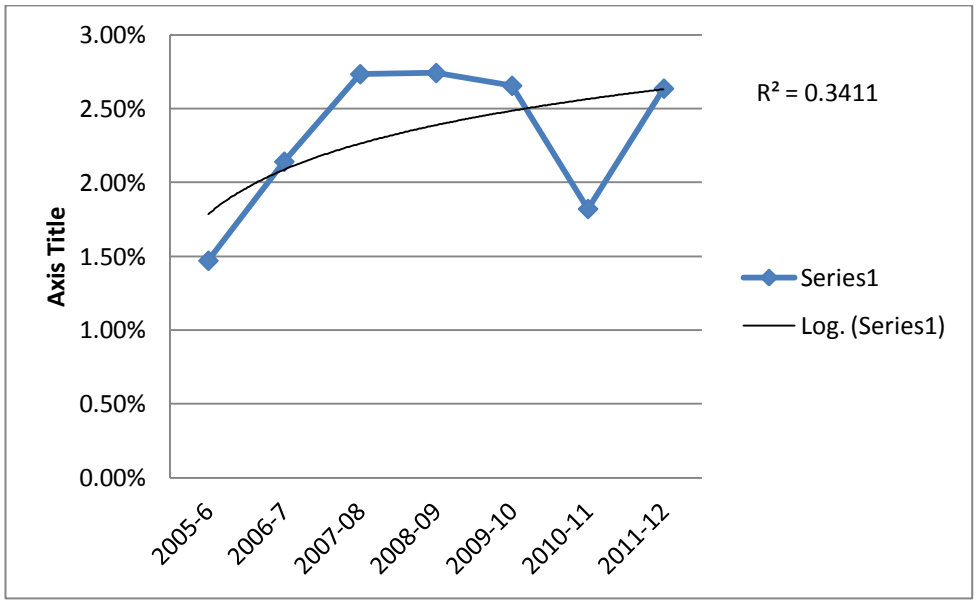


Figure 19 – Defective poles found for reinforcement as percentage of poles inspected

In forecasting the number of defective poles requiring reinforcement, it is evident that FY2010/11 appears to be abnormal in terms of the overall trend, based on the inspection results. Accordingly, this year was removed from the data set to allow for a more representative forecasting curve to be established, as shown in Figure 20.

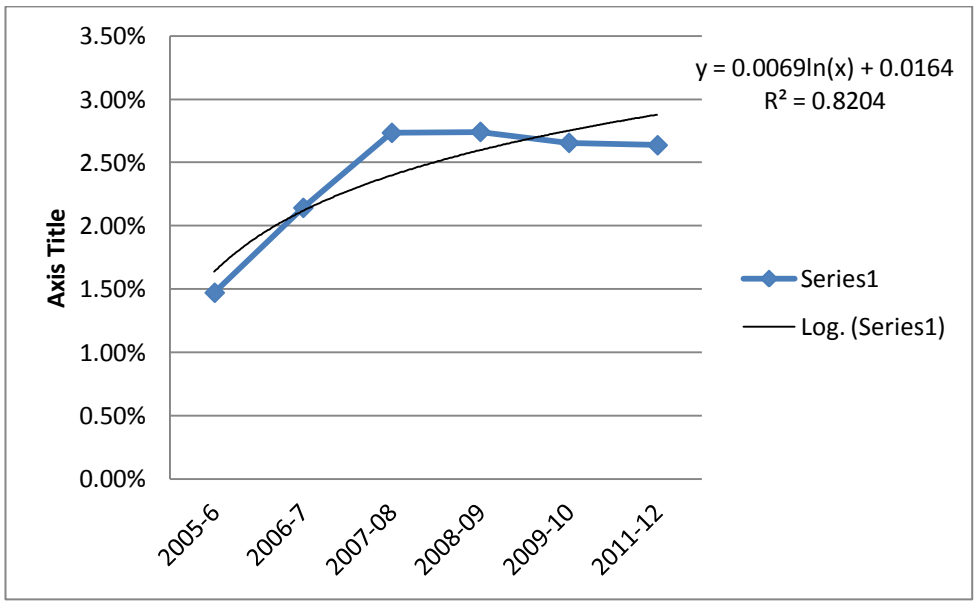


Figure 20 – Defective poles found for reinforcement as percentage of poles inspected

Although a number of curves were produced that fit this data set, some with higher regression values, the logarithmic curve appeared to represent the data set most appropriately. The curve

shows a flattening of the percentage over time, while remaining highly correlated to the data set. Alternative curves and coefficients of correlation are detailed in the associated Excel spreadsheet[6].

As shown above, the number of defective poles has been increasing over time from a base of 1.67 percent of the poles inspected in FY2005/06, to 2.64 percent in FY2011/12, with a peak of 3.54 percent in FY2009/10. Based on a logarithmic projection, this is anticipated to stabilise over the forthcoming regulatory periods as the ability to reinforce poles normalises at around 2.6 percent of poles inspected. This situation will, however, give rise to an increasing requirement to replace defective poles that are not able to be reinforced due to technical considerations.

In addition to the increasing defect rate requiring a replacement solution, consideration must also be given to the need to replace pole structures once the life extension (reinforcing) has come to the end of its useful life. The graph below shows the year of removal, based on a 15-year useful life, of the existing reinforcements on the system up to 2019.

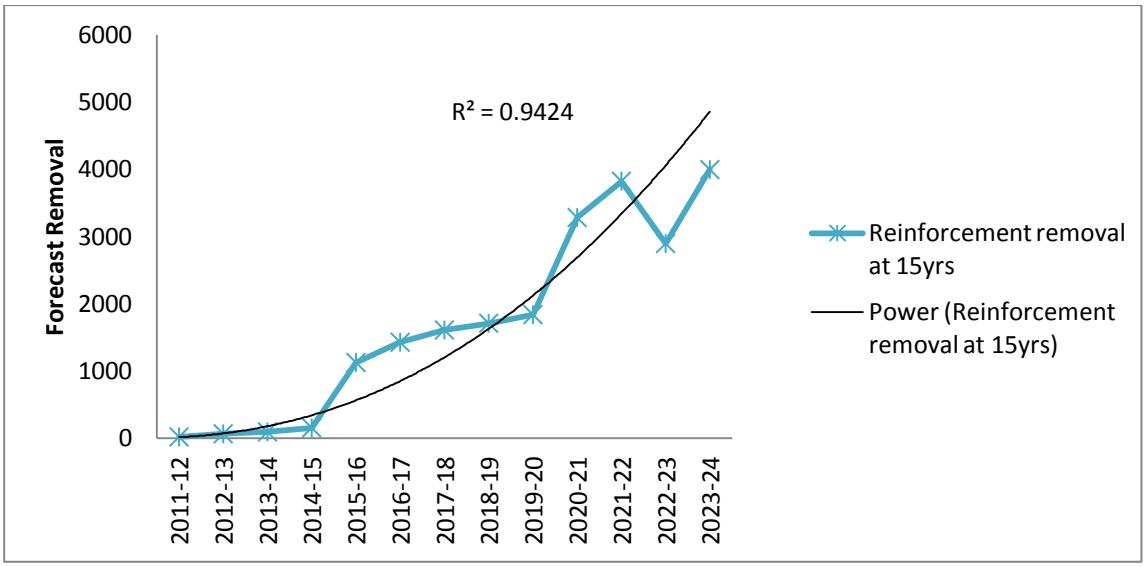


Figure 21 – Defective reinforcements by year of removal

A life estimate of 15 years was placed on the reinforced structure as an average life extension for investigation purposes. Alternatives of 10 years (based on original product warranty) and 20 years (based on the composition of the steel reinforcing structure) were also considered, and ultimately discounted, as either being too conservative or overly optimistic. Ultimately a 12-year average life extension was chosen as a balanced approach, as supported by Energy Networks Australia participants experience. Given that the ultimate life extension gained is dependent on the condition (and continued deterioration) of the wood structure, rather than the steel reinforcing product itself, a twelve year average life extension for the purposes of modelling was considered prudent.

The proposed program aims to mitigate the risks posed by this group of assets by progressively increasing the pole replacement program to cater for the increasing forecast number of poles requiring replacement, and the replacement of reinstated poles as they approach the end of their useful lives. Over time it is anticipated that the program will approach levels of replacement that are in line with the 'steady state' required replacement quantities, given appropriate average replacement lives.

[6] Analysis of Pole Replace and Nail - 04-05 to 11-12 and Regulatory forecast 2028 a.xlsm.

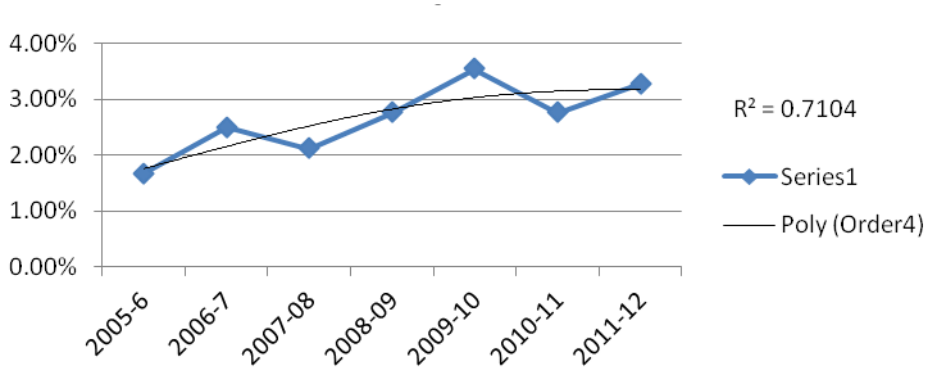


Figure 22 – Defective poles found for replacement as a percentage of poles inspected

In a similar forecasting process to that undertaken for nailed poles, the historical percentage of poles inspected that have required replacement has been analysed, to determine a robust projection of future requirements. Although a number of curves were analysed for use as a forecasting tool, the power equation shown in Figure 22 above returned the highest co-efficient correlation to the data, and also represented the best match in terms of shape.

The reason for this level of fit is two fold:

1. The curve continues to project an increase in poles that will require replacement over time, which both fits the historical experience and relates to a progression towards a healthy state replacement rate, given the achievement of an appropriate replacement age. While the exact appropriate age for Ausgrid's pole population, composition and operating environment can be debated, it is clear that the current levels of replacement are not sustainable at a population level that is currently achieving replacement levels of 0.75% of the population – this is equivalent to an assumed replacement life in excess of 130 years. This point is illustrated by Figure 23, showing the relationship between the percentage of the population replaced per year and the implied life.

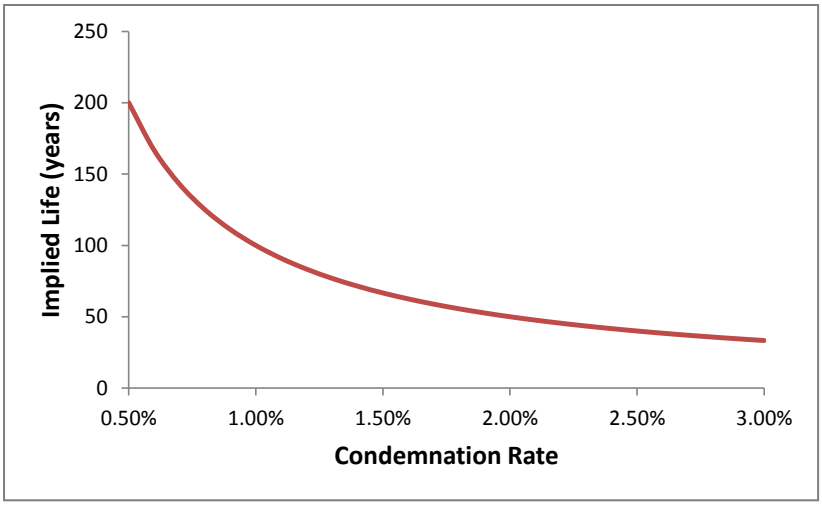


Figure 23 – Relationship between replacements per year and implied life of assets

2. The curve allows for future growth, but does so in a moderated way, that both allows the organisation time to meet the capability requirements, and avoids steep increases or changes to the required volume of replacement and expenditure. When coupled with the forecast removal of previously nailed poles that have extinguished the life extension benefits afforded by nailing, the program moves Ausgrid from its current untenable situation to a more positive future position over the next two regulatory periods. The future position will succeed in achieving a forecast, where the implied life of poles moves down to more realistic levels of just below 90 years by 2019 and 60 years by 2024.

8.3. Proposed Program – Quantities, Expenditure and Timing

Table 17 – Proposed Replacement sub-program All Poles and Pole Reinforcement

	14/15	15/16	16/17	17/18	18/19
Planned (No.)	7293	7779	7959	8196	9731
Reactive (No.)	0	0	0	0	0
Total (No.)	7293	7779	7959	8196	9731
Planned $M	55.0	59.2	61.0	63.3	79.5
Reactive $M	0.0	0.0	0.0	0.0	0.0
Total $M	55.0	59.2	61.0	63.3	79.5

Total expenditure on the program to address defective OH support structures is shown in the following tables, including pole reinforcement and replacement forecasts. The proposed future program aims to address the ongoing compounding replacement drivers of poles that are coming to the end of their serviceable life, and those that have already undergone life extension via reinforcement. In terms of previous and future program expenditure, the program delivers a relatively smooth progression over the next two successive periods. This is achieved by adopting a conservative forecast curve that is inclined towards a plateau, and incorporating the removal of previously reinforced poles as they reach their end of life, Further refinement of the model will be undertaken during the next period to further hone the forecast and progressively smooth the transition into the larger population of reinforced poles, particularly in the 2020–2024 regulatory period. Noticeably, there is an apparent disconnect between the forecast expenditure in the remaining two years of the current period and the starting point of the next. While it is envisaged that these stretch targets have been set, and may be achieved by the use of overflow contractors, experience to date indicates that a smooth transition from 2011/12 expenditure to the forecast 2014/15 expenditure levels is more likely, and the step will effectively be removed as a result.

8.3.1. Total pole replacement program

Table 18 – Proposed Pole Replacement program (DM and TM)

	14/15	15/16	16/17	17/18	18/19
Planned (No.)	4589	4959	5118	5321	6829
Reactive (No.)	0	0	0	0	0
Total (No.)	4589	4959	5118	5321	6829
Planned $M	52.7	56.9	58.7	60.9	77.1
Reactive $M	0	0	0	0	0
Total $M	52.7	56.9	58.7	60.9	77.1

8.3.2. Transmission OH Pole Replacement Program Reg ID: 05.02.06

Table 18 – Proposed Transmission Pole Replacement sub-program

	14/15	15/16	16/17	17/18	18/19
Planned (No.)	233	246	251	256	261
Reactive (No.)	0	0	0	0	0
Total (No.)	233	246	251	256	261
Planned $M	6.1	6.4	6.6	6.7	6.8
Reactive $M	0	0	0	0	0
Total $M	6.1	6.4	6.6	6.7	6.8

8.3.3. Distribution OH Pole Replacement Program Reg ID:04.02.02

Table 19 – Proposed Distribution Pole Replacement sub-program

	14/15	15/16	16/17	17/18	18/19
Planned (No.)	4356	4713	4867	5065	6568
Reactive (No.)	0	0	0	0	0
Total (No.)	4356	4713	4867	5065	6568
Planned $M	46.6	50.4	52.1	54.2	70.3
Reactive $M	0	0	0	0	0
Total $M	46.6	50.4	52.1	54.2	70.3

Note: Pole supports associated with single pole Pt's are addressed under a separate ACAPS document.

8.3.4. Pole Reinforcement Program Reg ID:04.02.34

Table 20 – Proposed Pole Reinforcement sub-program (DM and TM)

	14/15	15/16	16/17	17/18	18/19
Planned (No.)	2704	2820	2841	2875	2902
Reactive (No.)	0	0	0	0	0
Total (No.)	2704	2820	2841	2875	2902
Planned $M	2.2	2.3	2.4	2.4	2.4
Reactive $M	0	0	0	0	0
Total $M	2.2	2.3	2.4	2.4	2.4

Appendix A: Analysis of Historical Pole Defect Rates

As noted in preceding sections of this document, Ausgrid's pole population comprises a number of types of poles, including wood metal and concrete, There is some degree of debate at present within and across the industry of what constitutes a reasonable replacement age for these groups of assets, and is worth some discussion here with respect to the approach Ausgrid has taken to address this issue in developing its forward view of the replacement and reinforcement needs of these assets.

Ausgrid's population of poles is heavily skewed, with almost 90% of the population being wood poles of various varieties. In order for true comparisons to be drawn about the behaviours of the sub-types (wood/metal/concrete), the inspection and defect data, replacement cost and network composition, both from an historic and forecast program need to be understood. In order to understand the behaviour of these sub populations, an analysis of the historical performance by material (wood metal ad concrete) and sub type eg natural round, treated timber etc, was undertaken, specifically looking at the % of defective poles found year on year, to determine if a meaning full forecast could be developed on the basis of the behaviour within each sub group. The result of the analysis is provided below:

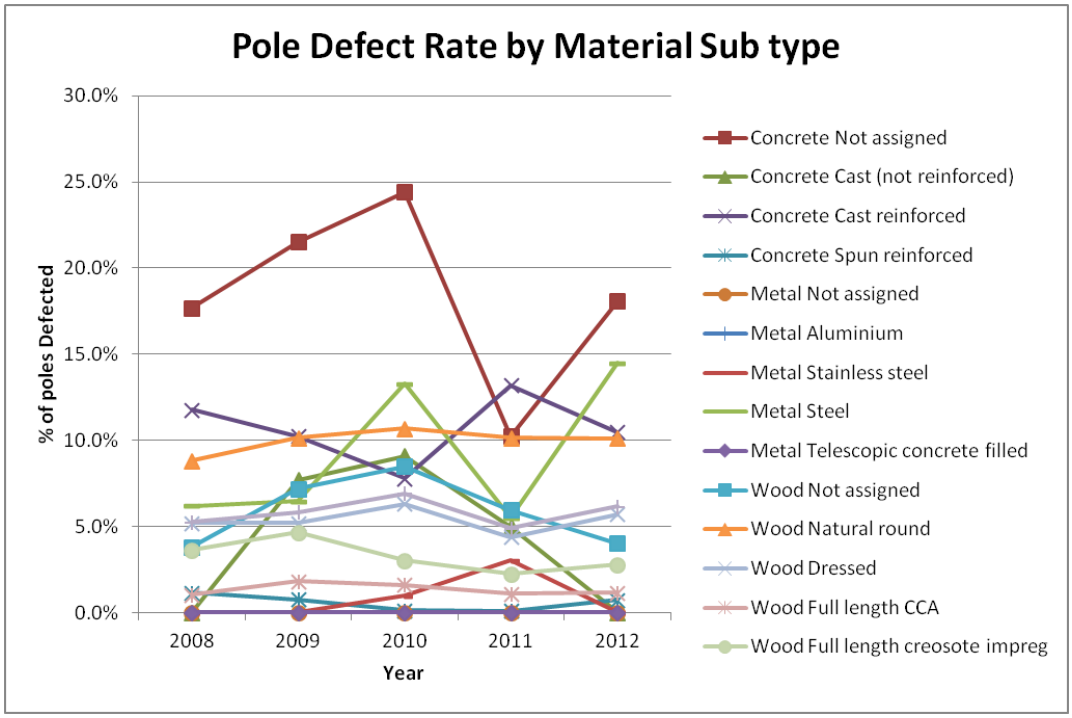


Figure X –Analysis of Historical Pole Defect Rates by material sub-type

The results by material sub-type as depicted above show that as based on percentages there are some large variances across material sub types, and there are some interesting observations to be made. The trends in the various wood pole populations appear to be more uniform, than those seen in both the metal and concrete groupings. Further, the year on year variance seen in both metal and concrete poles, implies that the defect rate per annum is not stable, and as such its usefulness as a predictor of future performance is diminished. Finally, the performance of wood poles and in particular wood dressed poles very closely follows the total population defect rate as a percentage of poles inspected. These observations at the material sub-type, are further illustrated by grouping the sub-types at the material level as shown below:

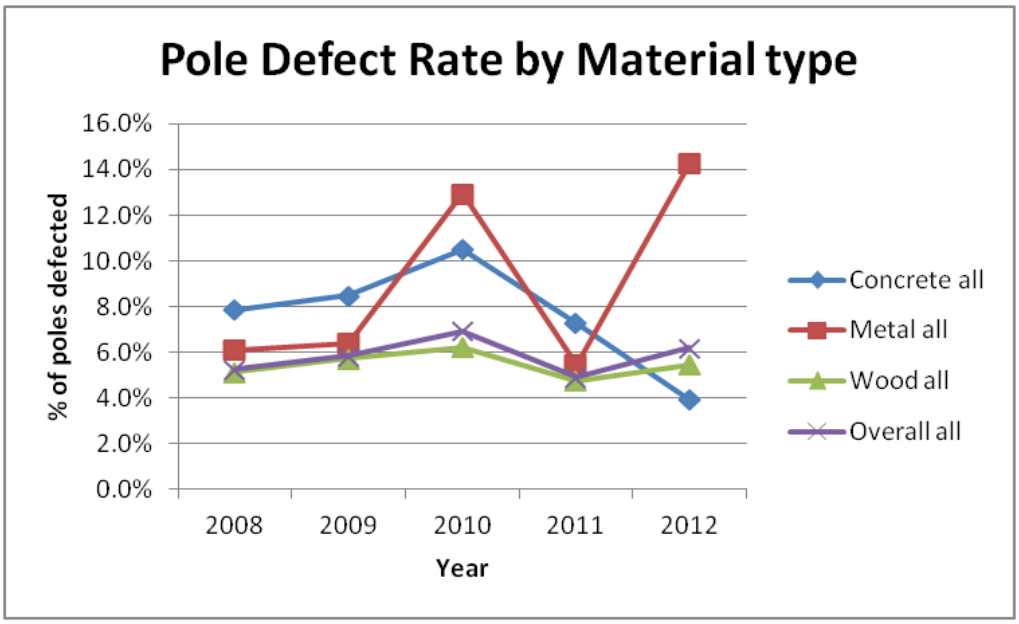


Figure X – Analysis of Historical Pole Defect Rates by material type

As shown above there are significantly large variations in the percentage of poles defected year on year within both the metal pole and concrete pole populations, with a factor of 2 difference between some years. Wood poles on the other hand are performing fairly consistently, and as anticipated due to the overwhelmingly large proportion on the overall population, effectively mirror the overall pole base.

Whilst the debate around standard accounting and achievable replacement lives of 45, 55 and 60 years for wood, concrete and steel poles continues, it is clear that Ausgrid's experience will be driven by our overwhelmingly large wood pole population, with minor deviations seen in the metal (9.5%) and concrete (0.5%) population having little material affect on the overall requirements of the organisations asset base.

Due to the large variances seen in both the metal and concrete pole defect trends, and the relatively small populations, Ausgrid has considered it prudent to forecast at a population level, allowing us to utilise overall system trends in developing the network's replacement and reinforcement needs, as detailed further in this document.

Appendix B: Supporting Documentation

Document Name	Location
Pole Equipment Count	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\ Equipment Pole Count (WTMG007a) - 20130110.xlsx
ENA Life Extension of pole Reinforcing	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\PPCF 2011.pdf
WESTERN POWER'S WOOD POLE MANAGEMENT SYSTEMS: REGULATORY COMPLIANCE AUDIT 2005 -	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\Report_Wood_Pole_Aud.pdf
NPV / Optimisation model analysis	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs – Photos, Popns etc\NPV Spreadsheet – 20140321 Condemned Poles FINAL March 2014.xlsm
Pole Defect Analysis	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\PINS and PASE for last 5 years by Material Type.xlsx
Pole Functional Failures over time	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\Pole Failure over time2011_12 update.xls
Pole Replacement Forecast	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc\Replacement and Reinstatement forecast FINAL 20140220.xlsx
Durability of Australian Timber in ground guide	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc
Ausgrid NS145 Pole Inspection and Treatment Procedures	Ausgrid Document System Balin
Ausgrid NS146 Safety Inspection Procedure for Working on Wood Poles	Ausgrid Document System Balin
Ausgrid NRS166 Line Inspection	Ausgrid Document System Balin
Ausgrid NS220 Overhead Design Manual	Ausgrid Document System Balin
AS7000, Overhead Line Design	Australian Standard
Maintenance Requirements Analysis Manual	Ausgrid Document System Balin
Network Technical Maintenance Plan	Ausgrid Document System Balin
Other Supporting information	\\Eahobcfp01\fsd\MOI\AER_Submissions\2014\Mains Working Files\Asset

	Condition Reports\ACAPS4001_Poles\Supporting docs - Photos, Popns etc

NS145

Pole Inspection and Treatment Procedures

June **2011**

Amendments included from: NSAs 1670 Sep 2012, 1693 Mar 2013 & 1755 April 2014

SUMMARY

Network Standard NS 145 describes the inspection and treatment procedures for poles.

ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with the inspection and treatment procedures for poles.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid's standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time.

It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to ensure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

Note that compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the WHS Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid's network, and will form part of the Designer Safety Report which must also be presented to Ausgrid. Further information is provided in Network Standard (NS) 212 *Integrated Support Requirements for Ausgrid Network Assets*.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid's interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid's interpretation.

Network Standard
NS 145
Pole Inspection and Treatment Procedures
June 2011

CONTENTS

1 Introduction

This Network Standard describes the inspection, assessment and treatment procedures for timber poles, reinforced poles, concrete and steel poles, composite poles, fibre composite poles, lighting standards, lightning masts and water crossing sign supports. These poles and standards represent a high capital investment by Ausgrid. Correct maintenance protects this investment and contributes to the safety of staff and the public.

2 Definitions and References

2.1 Definitions

Blackbutt Timber Species	Blackbutt timber species are defined as a Durability Class 2 timber, according to Australian Standard 1720 'Timber Structures'. Durability Class 2 timbers have a high natural durability which may be expected to have a life of 15-25 years. Poles with Blackbutt timber are identified by the pole disc indicating a species of 'BB'.
Common-Use Pole	A pole belonging to another public utility or authority, on which Ausgrid's wires are attached. The pole is mainly used to carry conductors belonging to the owner of the pole. These poles must not be inspected or treated.
Composite Pole	A pole which has the below ground portion of a timber pole replaced with a non-timber material, eg a steel reinforced concrete stub or a concrete filled steel stub.
Concrete or Steel Pole	A pole manufactured with reinforced concrete or steel.
Condemned Pole	A condemned pole assessed by Ausgrid as requiring replacement and usually marked by a single 70mm wide orange band located 2.4 – 3.0 metres above ground and a white painted diagonal cross at approximately 1.8 metres above groundline. Condemned poles must be removed from service or stabilised without undue delay. If you find a pole you consider to be dangerous, you must report it immediately to the Ausgrid Supervisor/Contract Officer/Customer Supply Office to ensure appropriate action is taken.
Copper-Chrome Arsenate (CCA) Impregnated Pole	A debarked, naturally round timber pole, with the sapwood pressure impregnated with Copper Chrome Arsenate (CCA) timber preservative. CCA poles are a greenish colour. The timber from CCA treated poles must not be burned, as the fumes given off are highly toxic.
Creosote Impregnated Pole	An undressed, fully sapped, lower durability class timber pole with the sapwood impregnated with high temperature creosote. Creosote pressure impregnated poles have a distinctive dark-brown colour and may 'bleed' free creosote when new.
Defective Pole	A pole in service identified by a single 70mm wide orange band located 2.4 – 3.0 metres above ground which, at the time of inspection, was assessed as having a residual strength of less than 50%, or an average wall thickness of less than 70mm (at or below groundline), or other defects such as vehicle damage which may affect its suitability to remain in service. Defective poles are assessed by Ausgrid for their suitability to be replaced, reinforced, or returned to service.
Design Load	The calculated load imposed upon the pole, under the wind loading conditions adopted by the supply authority, to comply with the requirements of the Network Management Plan February 2009 and ENA C (b) 1 – 2006 Guidelines for Design and Maintenance of Overhead Distribution and Transmission Lines.

Dressed Pole	An untreated timber pole, generally high durability class timber, which has been desapped and has a machined cross section.
Effect of Internal Defects	Internal defects, commonly caused by termites or fungal decay, can be considered pipes because rotten material has no strength and can be ignored for the purpose of strength calculation. The outer 20-30mm of a pole does most of the work in supporting the pole – hence the centre section of the wood is of less structural importance. An example using residual strength follows: A wood pole has an internal defect that is half as wide as the pole, located centrally. In a 400mm diameter pole this gives us a pipe size of 200mm and a wall thickness of 100mm. If you use the formula from Section 3.3.5 you get a remaining strength of 93%. This means even though all this wood has gone from the middle, the pole has only lost 7% of its strength.
Electricity Supply Network	The network of overhead and underground transmission, sub-transmission and distribution conductors and pilot cables, owned by Ausgrid and passing over either public or private property. Including the street lighting network supplying street lighting luminaires.
Fibre Cement Pole	Fibre composite pole are manufactured from fibreglass and cement, spun on a mandrel into a tapered tubular shape.
Fibre Composite Poles	Ausgrid has two types of manufactured fibre composite poles found on its network. They are fibre cement poles and fibre plastics poles.
Fibre Plastics Pole	Fibre composite pole are manufactured fibre composite pole from glassfibre and polymer resin. Usually not recommended to be used on Ausgrid's network because of their poor bushfire performance.
Fully Supported Poles	Fully supported poles are those which cannot fall to ground because their tops are held in place by conductors and/or stays. Examples are stayed angle poles, poles supporting conductors in three or more directions etc., where the conductor tensions are balancing each other.
Joint-Use Pole	A pole belonging to Ausgrid, to which another utility or authority's construction is attached.
	Ausgrid maintains an integrated Asset Management System (SAP) that records data in a SAP database. It contains data related to the construction and maintenance of Ausgrid's Network, including pole inspection and treatment.
MAM Device	Mobile Asset Management (MAM). Field device used to record inspection results, update master data and create notifications. Synchronising the device uploads / downloads information with SAP.
Natural Round Pole	An untreated timber pole with the sapwood still remaining.
Pole	A structure, excluding a steel tower, supporting the Electricity Supply Network. This includes poles used as support structures for Ausgrid maintained luminaries, lightning masts, water crossing signs and poles used to support Ausgrid's electricity network inside substation switchyards.

Private Pole	A pole not owned by Ausgrid. These include, for example, private poles belonging to the NSW Roads and Maritime Services, formerly known as NSW Roads and Traffic Authority, (to carry lighting and signage on road bridges, underpasses and overpasses) and private poles which form part of a customer's installation.
Regal Species	Regal species hardwood poles are naturally highly resistant to fungal and insect attack. These species are graded with respect to their strength and durability. The highest grading (grade 1) includes the ironbarks, tallow-wood, grey and yellow box, and white mahogany timber species.
Reinforced (Nailed or Splinted) Pole	A pole with the original foundation supplemented with a structural support system. This system may consist of either steel galvanised nails or splints, extending from below groundline to varying heights over one metre above groundline and attached to the pole by bolt or metal band.
Remaining or Residual Strength	Is the current strength of the pole as assessed by measurement of the loss of sound timber compared to the strength of the pole when new as assessed by average pole diameter measurement taken at nominal groundline.
Serviceable Pole	A pole in service which is considered to be capable of bearing its design load with a net residual strength of greater than or equal to 50% and an average wall thickness of 70mm or more (at or below groundline), and capable of lasting another 5 year inspection cycle.
Specialist Pesticide Officer	An authorised Pole Inspector specifically trained and individually authorised by Ausgrid to carry out termite treatment, other than bait installation, whose primary duty is termite eradication.
Street Lighting Pole	A pole used for the sole purpose of supporting street luminaire(s). The luminaire(s) may be either installed on or suspended from the pole.
Wall Thickness	The wall thickness is a measure of the remaining good wood after allowance has been made for internal defects and any rotten or defective external timber.
Wet Hole (including Free Ingress of Water)	Where water either exists in the hole as it is dug (e.g. permanently wet ground) or enters the hole from the surrounding soil immediately following excavation.

2.2 References

All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards including but not limited to:

2.2.1 Network Standards and Engineering Guidelines

Network Management Plan

NS 128 Specification for Pole Installation and Removal

NUS174 Environmental Procedures

SAP Training Manual (User Guide Appendix)

Utility Asset Management's Technical Manual

2.2.2 Australian and International Codes of Practice and Standards

AS 1720 'Timber Structures'.

AS 3818.11 Timber – Heavy Structural Products – Visually graded. Part 11: Utility Poles

AS 2878/2000 Timber – Classification into Strength Groups.

AS 3566.1-2002 Self-drilling screws for the building and construction industries - General requirements and mechanical properties

AS 3566.2-2002 Self-drilling screws for the building and construction industries - Corrosion resistance requirements

AS 7000:2010 Overhead Line Design

Electricity Association Specification Drawing EAS 111

ENA Doc 01 National Electricity Network Safety Code - 2008

Work Health and Safety Regulation 2011 Exemption Order No.0004/12 (Appendix E)

2.2.3 Product Information

Product Information and Safe Handling Procedure for PEC and CCA Treated Timber Poles and Cross Arms (NSW Electricity Supply Industry)

Product label for TERMIDOR® RESIDUAL TERMITICIDE

Product label for TERMIDOR® Dust Termiticide

Product label for NEMESIS Termite Bait

2.2.4 Training References

Pesticides Regulation 2009

Australian Qualifications Framework (AQF):

- Level 4 - such as ChemCert or SMARTtrain that includes units
  - AHCCHM401A – Minimise risks in the use of chemicals; and
  - AHCCHM402A – Plan and implement a chemical use program
- Level 3 - such as ChemCert or SMARTtrain that includes units
  - AHCCHM303A – Prepare and apply chemicals; and
  - AHCCHM304A – Transport, handle and store chemicals

Pole Inspectors Training (TAFE Course No.27510)

3 Pole Inspection Process – Wood Poles

3.1 General

Poles which are not owned by Ausgrid (eg private poles and common-use poles) are excluded from the requirements of this Network Standard and must not be inspected or treated, unless detailed in other contract documentation.

The pole inspection procedure generally consists of:

- Above groundline visual inspection and sounding.
- Partial excavation, inspection and assessment.
- Full excavation and below ground inspection and assessment.
- Treatment and site restoration.

Specific requirements for each pole type are detailed in the relevant sections.

Poles where an attached Termite Tag, with all 3 segments (‘T’ ‘T2’ and ‘T1’) still attached, identifies the pole as currently being under treatment, and are not to be inspected as part of routine pole inspection. A pole with a Termite Tag consisting of only the top, or top and second segment, (‘T’, or ‘T’ and ‘T2)’ attached indicates treatment has been carried out and initial control achieved, and full pole inspection may be carried out as normal. Poles with a 3 segment tag attached are to be marked on the daily pole inspection sheets as having ‘Active Termites’, and must be checked in SAP to ensure an open ‘Pole-Inspect’ or ‘Termite-Treat’ work item exists for that pole. If such a work item does not exist, a full pole inspection and treatment process must be completed on these poles. Refer to Section 3.5.7 for further details of the ‘Termite Tag’.

Defective poles that are supported by being attached to a new (replacement) pole, are not to be inspected or treated. Defective poles that are not attached to a new (replacement pole) are to be checked in SAP to ensure an open 'Pole-Replace', 'Pole-Reinforce' or 'Pole-Assess' work item exists. If such a work item does not exist, complete a full pole inspection and treatment, and immediately report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D).

3.1.1 Single Wire Earth Return (SWER) Substation Poles

The inspection and treatment of any SWER Transformer poles shall only be carried out while the feeder is out of service (under access permit) and should be completed in conjunction with Ausgrid’s annual inspection of SWER pole earthing installations and in the presence of a member of Ausgrid’s staff authorised to carry out such earthing installation inspections.

3.1.2 Partial Excavation

CAUTION

Extreme caution is to be exercised when excavating around a pole, particularly those that have cables and other items attached to them. Where a cable enters the ground from a pole, it should NOT be assumed that the cable enters vertically, nor that it is clear of the remaining inspection area around the pole.

Partial excavation should be carried out around poles on non-load bearing faces (Neutral axis) of the pole prior to full excavation. The purpose of partial excavation is to allow an examination of part of the below-ground section of the pole so it can be determined if it is safe to fully excavate. Partial excavation is only carried out in an unloaded or supported axis (Neutral axis).

3.1.3 Excavating Paved Surfaces

Paved surfaces around direct buried poles must be removed to allow below ground inspection, however concrete kerbs must not be cut or damaged. Paving tiles shall be lifted and removed or the edges of continuous paving sawcut, so that a rectangular inspection area is defined around the pole for a minimum distance of 200mm from the pole. Any pole that has continuous paving installed within 200mm of the pole is to have the paving saw-cut away to give at least 200mm minimum clearance around the pole and cold mix installed in accordance with the site restoration section.

After completion of the inspection and treatment process the paving tiles that have been shaped to fit neatly around the pole shall be put back as they were found. All other surface material inside the defined inspection area shall be removed from site. Where decorative concrete driveways or paths exist within 200mm of direct buried poles, the customer and Ausgrid must be notified and agreement obtained prior to any cutting and removal being undertaken.

Note: Direct buried poles must be accessible for below ground inspection. Where they are found in locations where they cannot be correctly inspected, such as shown above, either the obstruction must be removed to facilitate inspection or the pole relocated. A pole concreted in as shown is dangerous because it's below ground condition cannot be determined and fungal decay is likely to flourish in the high moisture environment. Situations where the full pole inspection process cannot be carried out must be reported to the Ausgrid Contract Officer or Distribution Engineering Mains Services.

3.2 Pre-job Hazard Assessment Check (HAC)

Ensure that the work area is safe and that all work is carried out in accordance with the applicable safe work method statement (SWMS), and provisions of the Work Health and Safety legislation and Ausgrid's requirements.

Perform a Pre-Job Hazard Assessment Check (HAC). The assessment must include above ground hazards (for example: loose sapwood, forgotten tools, loose fittings) to ensure that the pole is safe to work under.

3.3 Timber Pole Inspection

Figure 3.3.1 Timber Pole Inspection Flowchart is shown below.

TIMBER POLE INSPECTION FLOWCHART (Fig 3.3.1)

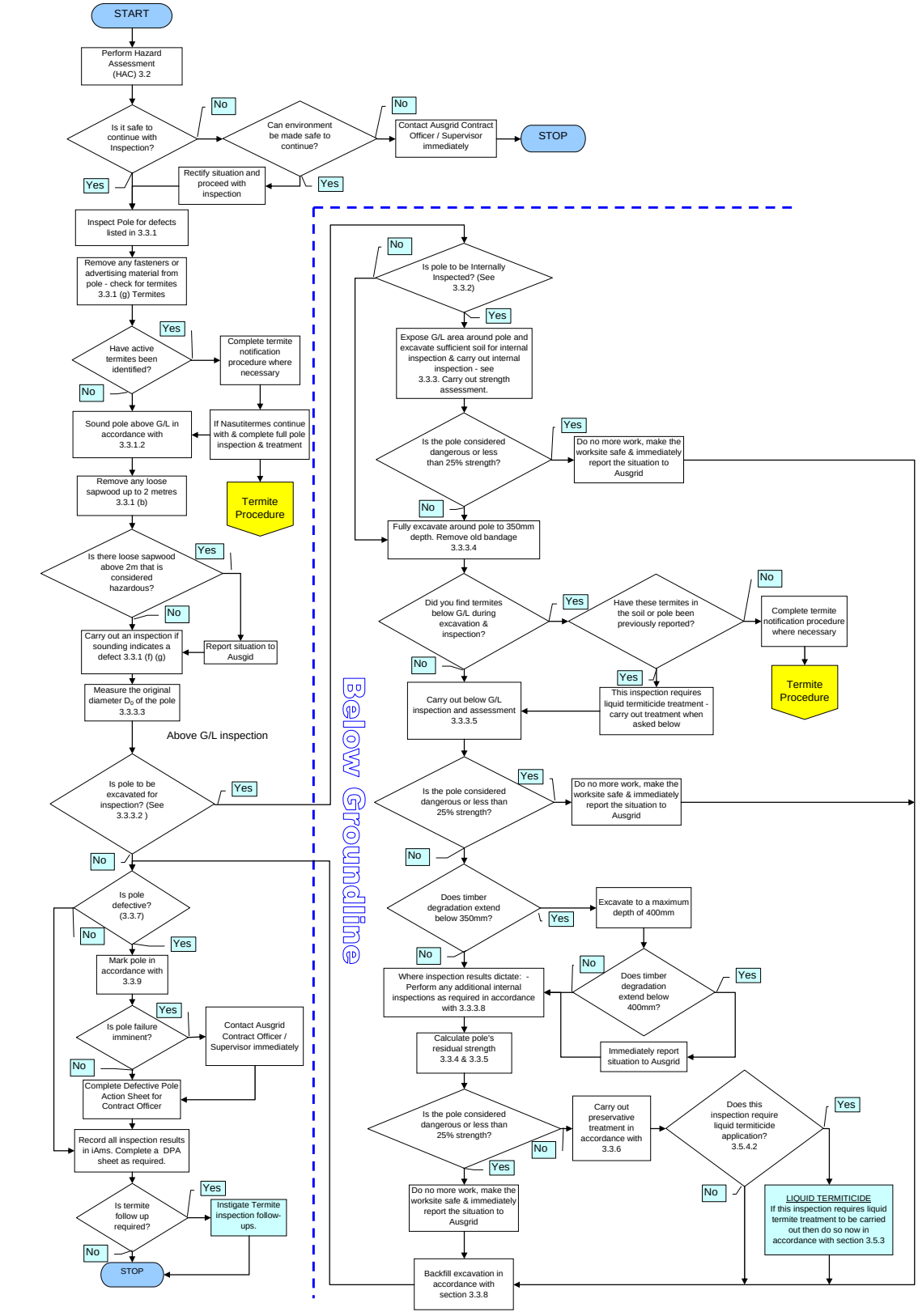


Figure 3.3.1: Timber Pole Inspection Flowchart

3.3.1 Above Ground Pole Inspection Process – Timber Poles

Inspect the timber pole above ground as follows (a) to (h) inclusive:

(a) Inspect pole for defects listed below:

- **Depth in Ground:**
  - Failure to place a pole deep enough in the ground can severely reduce the stability of the pole.
  - It is important to be aware if the ground level has been lowered relative to the pole, refer to Figure 3.3.2. A pole will lose significant stability with any reduction of depth in ground. Typically, road re-alignment work may result in a pole having less depth in ground. Look for evidence on the pole of an old 'ground level' mark, or 'high tide' mark to indicate that the pole is no longer as deep in ground as originally installed. Appendix A describes the correct height of pole discs, which are a good indicator of pole sinking depth (refer to NS 128 for the correct pole sinking depths). In addition, in the ex-Mackellar district, poles were marked with a 'T' shaped notch 10 feet from the base of the pole. Great care should be exercised before digging out a pole that has less depth in ground than when originally installed. Where doubt exists the pole should be reported to the Ausgrid Supervisor / Contract Officer and inspected before any excavation is carried out.

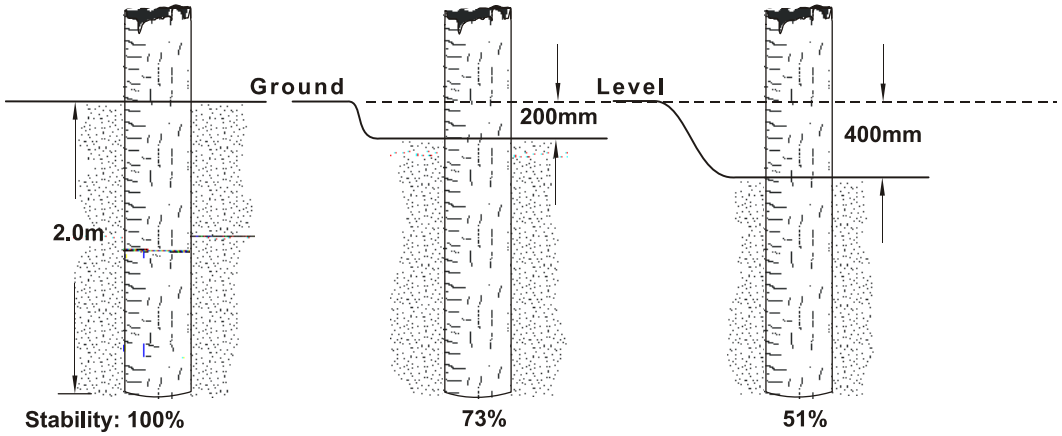


Figure 3.3.2: Effect of Depth in Ground on Stability

- **Vertical Alignment.** Look for reasons why the pole is leaning and the consequences of the lean such as reduced conductor clearance or traffic obstruction caused by pole leaning into a traffic lane or driveway. A pole leaning in ground, as opposed to a pole that is vertical in-ground but has a permanent bend due to a heavy load, is to have its lean in degrees noted in the inspection report. A pole leaning more than 10° is to be classified as defective. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D) and mark the pole in accordance with Section 3.3.9. The angle of the pole must be accurately measured using an approved device capable of providing accurate reading. Estimates of lean taken by eye will not be accepted.
- **Fire-damaged CCA** treated timber (see Appendix C).
- **Fungal Decay**. Brown Rot, White Rot, Soft Rot and White Pocket Rot.
- **Fruiting Bodies.** Look for decayed timber and fruiting bodies on pole. Where fruiting bodies are identified, the pole is to be sounded in that region of the pole and an internal inspection carried out. Where fruiting bodies are identified above 2 metres, it is to be reported. Fruiting bodies above 2 metres are to be inspected by a qualified pole inspector when arrangements can be made for equipment to allow the work to be carried out.

- **Termites.** The search for active termites will consist of the following procedures:

  1. Gently break open any mudded termite galleries looking for active termites. An old hacksaw blade or a drill can be helpful in investigating mudded checks in poles that extend deep into the wood. A mirror to direct sunlight, or a torch, is helpful in checking for active termites.

  2. Cut away any loose sapwood where external termite damage exists. Termites may be found under intact sapwood.

  3. Remove all external above ground plastic plugs and check for mudding and termites inside the hole. Use a Borescope to check for active termites inside the pole where evidence of termites exits (a Borescope is an essential tool when carrying out this work). It is often necessary to drill additional holes above ground line when searching for termites. Following treatment, termites will commonly abandon previous areas of infestation and move elsewhere and may only be found by drilling additional inspection holes. It is less damaging to the pole, and therefore preferable to drill in the neutral axis or into an existing check in the pole above groundline when searching for termites. Termite inspection holes should be no larger than 12mm diameter, and treated with Preschem rods and sealed with Black plugs when finished.

- **Knot holes, Grub Holes, and Checks.** Any knot holes within 1 metre of ground line are to be reported, together with the diameter of the knot. Knot holes, grub holes and checks are to be treated in accordance with Section 3.3.6.11. Look for termite flight holes in the ground line region and determine if they are borers or possible Glyptotermes Sp termites.

- **Stays.** Ensure stays installed in ground have a firm footing. Check stay tension and carry out visual on footing looking for defects.

(b) Prior to excavation around the base of the pole or the stripping of any loose surface material from within the inspection area, all protruding fasteners (including nails) and advertising materials are to be removed from the surface of the pole. It is acceptable, where many fasteners such as nails and staples exist on the surface of the pole, that they may be driven flat so as not to present a hazard, rather than complete removal of each fastener. The surface of the pole shall be visually inspected for evidence of termite activity, fungal decay, and any other defect including those listed below. Wood poles must not be painted. Where paint is found on wood poles it must be removed or reported to the relevant Supervisor / Contract Officer.

(c) If evidence of termite infestation exists, and a termiticidal dust or bait is to be used, avoid disturbing the termites as much as possible. Complete the Termite Treatment Report Form (see Section 7 and Appendix D) and attach a ‘Termite Tag’ (Stockcode 91975) in accordance with Section 3.5.7.

(d) If no termites are present or if active termites have been sighted and a liquid termiticide will be used to treat the termites, sound the pole above ground line in accordance with Section 3.3.1.2. If a termiticidal dust treatment or bait is to be used, no sounding or general excavation is to be carried out, other than the minimum necessary to prove the pole’s integrity. (See Section 3.3.1.1 for procedure where termites are found above ground-line and a termiticidal dust or bait is to be used.)

(e) Except for Copper Chrome Arsenate (CCA) impregnated poles, decayed and loose wood up to 2 metres above ground is to be removed with an axe. However care MUST be taken not to damage the heartwood with the axe. Where loose sapwood exists on any timber pole above 2 metres that is considered hazardous, report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete an SAP Pole Defect Report Sheet (see Section 7 and Appendix D).

(f) Inspect the timber where sounding indicates a defect exists. Where the defect is external, all defective timber must be removed so the full extent of the defect is revealed and can be measured. Pay particular attention to areas under loose sapwood because fungal decay commonly proliferates in these areas. If at any stage during your inspection you consider the pole's condition to be potentially dangerous, or it appears to be loaded close to or beyond its available capacity, or appears to be in danger of immediate collapse you must stop work, make the work site safe and immediately report the pole to the Ausgrid Supervisor / Contract Officer so appropriate action can be taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D). Sound timber must not be removed to get to the fungal decay nor should sound timber be removed to retain a symmetrical appearance. Every effort should be made to avoid the 'hour glass' effect by tapering off chipped areas. Where it is difficult to determine the extent of deep external pockets of rot without damaging adjacent sound timber, a drill should be used to probe and measure the extent of the defect.

(g) Where the defect is internal, inspect in accordance with Section 3.3.2.

(h) If any external decay is found on a Copper Chrome Arsenate (CCA) impregnated pole with a disc date after 1991, it MUST be immediately reported to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D). The pole shall not be scraped or cleaned with any tool at this time, however the remaining tasks of the inspection procedure shall be carried out.

3.3.1.1 Procedure where Active Termites are found and a Termiticidal Dust or Bait is to be Used

When active termites are identified in a pole prior to excavation around the pole, all above ground visual checks must be completed, but no sounding or general excavation is to be carried out, other than the minimum necessary to prove the pole's integrity. A check of the below ground condition of the pole is to be carried out by scooping a minimum quantity of soil from one side of the pole in the neutral axis and carry out an internal inspection 100mm below ground-line in accordance with Section 3.3.3.4.

Where full excavation has already been carried out, the full pole inspection procedure should be completed. The act of excavating around the pole will probably have temporarily destroyed the subterranean galleries causing extensive disturbance to the termite activity and only minimal additional disturbance will result from the full inspection procedure being completed.

If active termites have been sighted complete a Termite Treatment Report Form (see Section 7 and Appendix D).

3.3.1.2 Sounding a Wood Pole

You must sound the pole as part of the above ground inspection, and again as part of the below ground inspection. When performing sounding of a pole you must concentrate on both the sound that is developed and the amount the hammer rebounds:

- A good pole will 'ring' or resonate when correctly struck with a hammer. The hammer blow will generate a distinctive solid sound, a sharp 'whack' or hard 'tap', and a noticeable rebound when struck.
- A bad pole will not 'ring' or resonate, but give a dull 'thud' or a soft 'thump' sound and a small, or no rebound.

The external surface of the pole near the bottom of the excavation cannot be readily struck with a hammer but must be tested by striking with a rounded point bar as outlined below.

Above Ground

It is important to thoroughly sound the pole near groundline because this is the most likely location for defects to occur.

Above ground sounding of a timber pole shall be performed using the ball of a ball pein hammer.

Test the timber pole by striking it firmly with a hammer. The ball of a ball pein hammer is commonly used because a consistent sound will be generated regardless of the angle at which the ball strikes the pole, but the pole must be hit firmly in order to generate an indicative sound. Other tools, such as a flat faced hammer, or the back of an axe, shall not be used for above ground sounding unless Ausgrid is confident in the ability of the Inspector and the Inspector has been individually authorised by the Ausgrid Supervisor/Contract Officer.

Where the timber surface is affected by minor decay it is necessary to hit the pole harder in order to compress the decayed timber and generate an indicative sound. Where a 'good' sound cannot be generated this generally indicates a defect. Loose sapwood will generate a defective sound and must be investigated to confirm it is only loose sapwood giving the bad sound. The defective area must be investigated by removal of decayed timber if on the outside of the pole, or by an internal inspection drill if the defect is internal.

General Procedure

Sounding prior to excavation must extend right down to groundline (to within 50mm), and to as high as you can comfortably reach. To sound a pole it is necessary to carry out at least 8 soundings around the circumference, one on each flat face of a dressed pole, within 50mm of groundline, then at least 4 times around the pole at each 500mm interval above groundline to as high as you can comfortably reach. However some poles will need to be sounded at much closer intervals than the minimum specified above, particularly where a defect is indicated at ground line. Where defects such as fruiting bodies, knots, checks, termite damage, loose sapwood, or other visual indicators are seen on the pole, a more thorough sounding is required.

3.3.2 Internal Inspection of Poles

Internal inspections shall be performed using a brace and bit, suitable battery powered drill or variable speed 240 volt electric drill. Other types of drills, such as petrol, pneumatic or hydraulic shall not be used for internal inspections unless it is necessary for the particular job being carried out and the operator has received sufficient training and been individually authorised, having proven competency to Ausgrid's satisfaction.

Internal Inspections shall NOT be carried out on the following poles:

- new timber poles during the first five years from the disc date
- Copper Chrome Arsenate (CCA) impregnated poles.

UNLESS:

- the timber species is Blackbutt; or
- there is active termites in the pole, or
- evidence of fungal decay (a fruiting body is evidence of fungal decay), or
- sounding indicates a defect in the pole, or
- in any instance, on CCA poles over 15 years old, where the CCA treated timber below groundline is defective (see Appendix A to determine pole age). That is, where the treated sapwood below ground has become degraded, which is generally indicated by the presence of soft rot and the formation of a 'ladies waist' below ground line. This will generally, but not necessarily, result in a

reduced diameter below groundline. We are relying on an intact treated sapwood band to provide the pole's strength. Where this timber in the critical zone has been compromised, then the pole must be internally inspected; or

- a possible defect is indicated during the external inspection process – this will generally necessitate an internal inspection at the location of the defect, NOT 100mm below groundline unless that is the location of the defect; or
- there is no pole disc (see Appendix A).

All inspection holes are to be treated in accordance with Section 3.3.6 and sealed with blue or black plugs as applicable.

All below ground inspection holes are to be drilled at 45° to the pole (see Figure 3.3.3). All above ground inspection holes are to be drilled at 90° to the pole face except the inspection holes for reinforced poles (Grey plug). These inspection holes are to be angled upwards at five degrees so water will drain out. All inspection holes drilled at the current inspection are to be sealed with Blue plugs, however, above ground inspection holes for reinforced poles are to be sealed with Grey plugs to identify their purpose.

Note: Above ground inspection holes for reinforced poles must not be treated with a timber preservative product. If these inspection holes are treated with a preservative they will not be indicative of the true degradation at future inspections.

Stockcodes

Item	Stockcode
Blue 30mm long 16mm by 10mm taper - Preschem 01 PP12	179451
Grey Plugs	Special order

IMPORTANT

It is critically important to the life of a CCA pole that they not be routinely drilled until such time as the effect of the pressure impregnated preservative has ceased and timber degradation has commenced. Routine drilling from early in their life will make them unserviceable long before their anticipated life is realised.

3.3.2.1 Drilling Assessment - Internal Inspection Methodology

The objective is to accurately assess the thickness of sound timber, and in so doing determine the size and cause of any internal defect.

This assessment is carried out by drilling into the timber in the area to be assessed in such a manner that the drill will indicate to the inspector whether it is penetrating sound timber or not. The sound the drill makes, the smell of the wood shavings, the feel of the drill, the resistance to its progress and how strongly the worm on the drill pulls into the timber will all provide indications about the condition of the timber. It is imperative that the drill not be pushed through the timber.

Internal inspection is carried out using a 14mm auger bit. Do not use a larger size bit as this size has been found to produce consistent results while keeping the hole as small as possible. Inaccurate drilling angles will generate inaccurate sound wood measurements. It is necessary to be accurate to within plus or minus five degrees to obtain an acceptable result.

Note: A Borescope shall be used for internal inspection of the pole where termites are suspected to be present, or a pipe or internal void is found.

3.3.2.2 Above Ground Line Inspection of Wood Pole

Following your above ground line sounding, carry out an internal inspection at any point you consider a defect exists. Be aware that drilling holes in poles is destructive to the pole and will ultimately make the pole unserviceable if too many holes are drilled. However it is essential that, where timber degradation has taken place, the minimum wall thickness be identified so the pole's residual strength can be determined. Therefore, where sounding indicates that the pole has suffered degradation and a defect exists, it must be internally inspected at the location where sounding indicates the wall thickness is least.

Where the defect is external, all defective timber must be removed so the full extent of the defect is revealed and can be measured. Pay particular attention to areas under loose sapwood because fungal decay commonly proliferates in these areas. If at any stage during your inspection you consider the pole's condition to be potentially dangerous, or it appears to be loaded close to or beyond its available capacity, or appears in danger of collapse you must stop work, make the work site safe and immediately report the pole to the Ausgrid Supervisor / Contract Officer so appropriate action can be taken. Record all measurements in SAP and on a Defective Pole Action (DPA) sheet (see Section 7 and Appendix D). Sound timber must not be removed to get to the fungal decay nor should sound timber be removed to retain a symmetrical appearance. Every effort should be made to avoid the 'hour glass' effect by tapering off chipped areas. Where it is difficult to determine the extent of deep external pockets of rot without damaging adjacent sound timber, a drill should be used to probe and measure the extent of the defect.

If any external decay is found on a Copper Chrome Arsenate (CCA) impregnated pole with a disc date after 1991, it MUST be immediately reported to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D). The pole shall not be scraped or cleaned with any tool at this time, however the remaining tasks of the inspection procedure shall be carried out.

Where the defect is internal, inspect as follows:

3.3.2.3 Internal Inspection Procedure

(a) Drill carefully until you notice the first sign of an internal defect (clear out the drill hole). Insert the gauge into the bored hole until it rests against the end of the hole and record the reading.

CAUTION
Make sure that the scale on the probe you are reading is the correct one for the angle at which you drilled the hole as it will result in incorrect measurements if not.

(b) Remove the probe and continue drilling. If after you start to drill again, you feel the wood is still sound, then disregard the first reading and continue as in Step (a). However, if your renewed drilling confirms the start of the defect then proceed with the next steps. The recorded measurement is the front wall thickness.

(c) Drill and record the measurement to the back wall of the defect. Continue to drill until you feel that you have reached the far side of the defect and may have encountered sound wood. Stop drilling and use the probe to take another measurement (clear out the drill hole before using the probe).

Once again remove the probe and confirm that you did measure to the far side of the defect accurately by continuing to drill another 20mm. As in step (b) if you felt your reading is wrong then repeat step (c) again.

(d) Subtract the measurement to the back wall, from the minimum diameter of the pole. This will give you the wall thickness at the back of the pole.

Note the measurements obtained and compare the two wall thickness measurements (ie front wall 'A' and back wall 'D_1-B' – references from DPA sheet).

Multiply the smaller of the two wall thickness measurements by two and subtract the result from the minimum outside diameter of the pole (D_1). This gives you the diameter of the internal defect ('d' measurement as used in the pole strength calculation).

The result of ALL internal inspections must be recorded in SAP and on a Defective Pole Action (DPA) sheet if the pole is found defective (see Section 7 and Appendix D). However the largest defect size at each level shall be used in the residual strength calculation for that level. Record the cause of all internal defects.

Assess the pole's strength, in accordance with Section 3.3.5. A residual strength calculation shall be carried out for each level of the pole where a defect has been found and measured. The pole's reported strength is to be the lowest of these strength figures.

Record the type of internal or external defect found in accordance with Section 7 Reports.

3.3.3 Partial Excavation, Excavation and Below Ground Inspection - Timber Poles

3.3.3.1 Cautionary Notes

1. Extreme caution is to be exercised when excavating around a pole, particularly those that have cables and other items attached to them. Where a cable enters the ground from a pole, it should NOT be assumed that the cable enters vertically, nor that it is clear of the remaining inspection area around the pole.
2. Partial excavation should be carried out on non-load bearing faces (Neutral axis) of the pole prior to full excavation. The purpose of partial excavation is to allow an examination of part of the below-ground section of the pole so it can be determined if it is safe to fully excavate. Partial excavation is only carried out in an unloaded or supported axis (Neutral axis).
3. The below ground section of a pole is subject to thorough inspection between ground line and 350mm below ground line. This section of the pole is commonly referred to as the critical zone because it is subject to the most bending load and generally suffers the greatest degradation due to the relative moisture and oxygen levels in this layer of soil.
4. Concrete kerbs are not to be cut or damaged, however poles installed in close proximity to concrete kerbs must be carefully probed in the area facing the kerb because this area will retain moisture and is more likely to suffer fungal decay damage than other areas around the pole.
5. The pole should be excavated such that a thorough testing of the pole can be carried out using the rounded point bar from ground line down to 350mm below ground line. No concrete (kerbs excepted), tree roots or other obstructions are to be in contact with the pole or be in a position that prevents correct use of the rounded point bar. Services, such as storm water pipes, are not to be damaged, however where their location prevents a correct inspection being carried out it should be reported to the Supervisor / Contract Officer.

3.3.3.2 Procedural Notes

1. Timber Poles less than 5 years old shall not be internally inspected except under circumstances detailed in Section 3.3.2.
2. CCA pressure impregnated timber poles less than 15 years old, excluding Blackbutt species, are NOT to be routinely excavated or internal inspected below groundline except under circumstances detailed in Section 3.2.2.

3.3.3.3 Original Diameter Measurement

Measure the original diameter (D_0) of the pole in accordance with Section 3.3.4.

3.3.3.4 Partial Excavation, Internal Inspection

Expose the groundline area around the pole by lifting and removing paving tiles, or carry out saw cutting and removal as required.

Do not excavate fully around a pole initially in case the pole has become dangerously degraded.

Excavate only sufficient material to allow an internal inspection to be carried out in the neutral axis 100mm below groundline. Where it is determined that the pole has become degraded and the residual strength is 25% or less, and you consider the pole to be loaded close to or beyond its available capacity, or it appears to be in danger of collapse, do not continue with the excavation, refill the existing excavation and immediately report the pole to the Ausgrid Supervisor/Contract Officer/Customer Supply Office to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D).

Where it is safe to proceed and no Coptotermes Sp termites have been identified, fully excavate around the pole to a depth of 350mm. Remove the Bioguard Bandage and dispose of in accordance with Section 3.3.6.8.

Inspect for termite activity in the excavation and the excavated soil. Take note if active termites are sighted and complete a Termite Treatment Report Form (see Section 7 and Appendix D) and install a 'Termite Tag' as in Section 3.5.7.1. The inspection should continue even if active termites have been identified, because they have not been seen above groundline, only below ground in the soil, meaning subterranean galleries have probably been dug up and considerable disturbance of the termites has already occurred.

Scrape pole with a chisel pointed bar to remove loose soil and debris, as well as any decayed timber.

Use a rounded point bar to test the soundness of the exposed timber as explained in Section 3.3.3.7.

3.3.3.5 Below Groundline Internal Inspection

Before you fully excavate, carry out an internal assessment on the pole in the neutral axis, at a depth of 100mm below the lowest point on groundline. To do this you must scoop out a small amount of fill from the base of the pole at the place at which you will drill. (Bore the hole at 45° to the pole's surface (see Figure 3.3.3).

Note: Take into account the location of any attachments such as Underground to Overhead (UGOH) cables, so that when deciding where to drill you do not drill directly towards them, and keep in mind the pole's diameter and how far the drill is into the pole so as not to drill out the back of the pole and into an attachment. If the pole has previously been bored where you wish to drill, bore the new hole 100mm below the old hole, or on the opposite side of the pole. Where internal inspections have already been carried out in these locations internally inspect 50mm to the side of previous locations. For information on how to find the neutral axis see Appendix B.

After measuring and recording the original diameter of the pole at ground line (D_0 measurement as used in the pole strength calculation),

- and carrying out the below ground timber pole external testing procedure in Section 3.3.3.7.
- and recording the minimum diameter of the pole (D_1 measurement as used in the pole strength calculation),

Carry out an additional internal inspection if testing with the rounded point bar indicated an internal defect may exist. Test at the point below groundline where the wall thickness is expected to be least.

Note: Drilling holes in poles is destructive to the pole and will ultimately make the pole unserviceable if too many holes are drilled. However it is essential that, where timber degradation has taken place, the minimum wall thickness be identified so the pole's residual strength can be determined. Therefore, where sounding indicates that the pole has suffered degradation and a defect exists, it must be internally inspected at the location where sounding indicates the wall thickness is least.

Where:

- any pole test result shows that the pole has less than 25% residual strength; DO NO MORE below ground inspection. Refer to Section 3.3.7.
- the pole test results show that the pole has more than 25% residual strength; continue with the below ground inspection.

Carry out the internal inspection procedure as detailed in Section 3.3.2.3.

CAUTION
If you have found termite flight holes in the ground line region that may be due to Glyptotermes Sp termites, pay particular attention when drilling for the characteristic 'good wood / bad wood' effect of a Glyptotermes infestation.

Note: Ausgrid requires that all poles have an average wall thickness of 70mm or greater (at or below groundline). If the average of the front and back wall measurements obtained from internal inspections (ie front wall 'A' and back wall 'D1-B') are less than 70mm, the pole is classified as defective. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D) and mark the pole in accordance with Section 3.3.9.

Where:

- this internal defect size is greater than 100mm, and
- the back wall measurement is smaller than the front wall measurement, indicating the defect is increasing in size with depth, and
- the pole is rated serviceable to this point,

carry out another internal inspection at 100mm lower than the original, in the same axis. Record the measurements as above. Where an internal inspection has already been carried out in this location, internally inspect 50mm to the side of this hole.

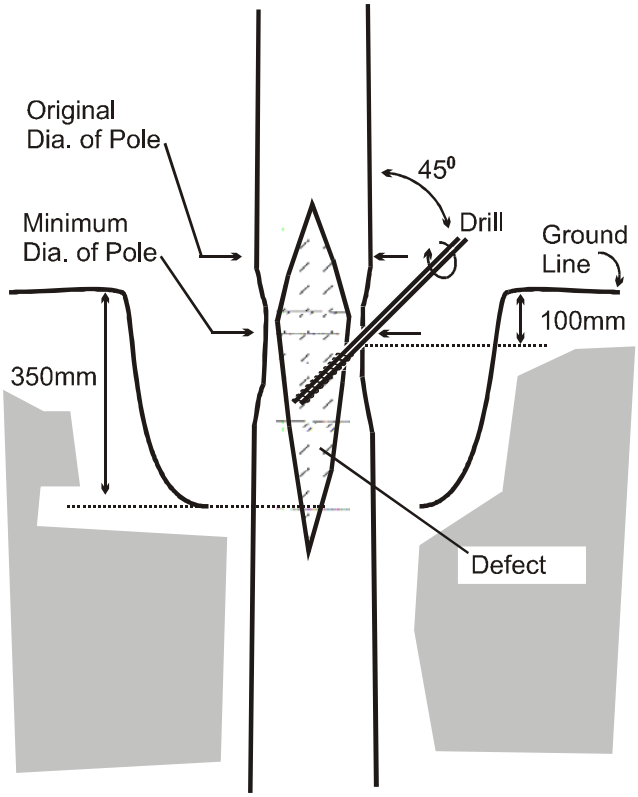


Figure 3.3.3: Drilling Angle Below Ground Line

Mark the pole immediately above ground line using yellow crayon, pointing down to the location of the below ground inspection hole(s) that you drilled at the current inspection and sealed with a Blue plug(s).

3.3.3.6 Rounded Point Bar

A rounded point bar (5mm radius point – Stockcode 180047) is used to test the pole from the bottom of the excavation up to groundline. The bar may be dual purpose with a chisel point one end and the rounded point on the other end. The chisel-end being used to scrape soil and decayed timber from the pole. However this should not detract from the prime use of the bar as a pole inspection tool. A bar weighing 6 kg with a 'rounded point' ground hemispherically to a 10mm diameter (or 5mm radius point) has been found suitable for inspection of most hardwood timber power poles. However where softer timbers are encountered a larger radius tip is required to ensure that wood fibres are not cut by the impact of the bar. It is important that use of the bar does not result in permanent damage to the face of the pole, particularly CCA poles, and under no circumstances is a sharp point to be used that will damage sound timber.

3.3.3.7 Below Ground - External Testing Procedure

Sounding of wood poles below ground line is carried out with a hammer to as far as can be reached, then a rounded point bar. When using the bar, strike the pole firmly at the base of the excavation so the bar strikes the pole where it meets the soil. The bar should deflect off the pole if it is solid, the point of the bar embedding itself into the soil at the base of the excavation. After testing at the base of the excavation, the bar should then be used to impact the pole immediately above this point, then test again every 50mm in a vertical line up to ground line. The pole should be tested in this manner at least every 100mm around the pole. It is critical that this procedure be carried out rigorously and methodically to ensure the safety and strength of the pole.

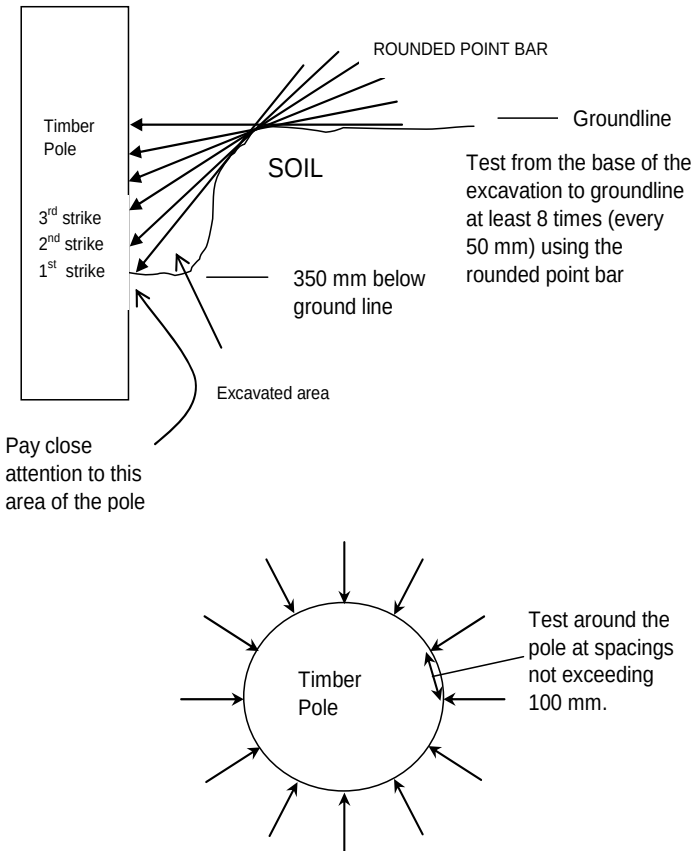


Figure 3.3.4: Sounding with Round Pointed Bar

Particular attention must be payed to the area of the pole at, and below, the bottom of the excavation. If severe decay exists deep below the excavated area, there will commonly be detectable decay near the bottom of the excavation. In most instances the pole's condition will improve with depth, however under some conditions the pole will deteriorate below the excavated area. Be aware of this and pay particular attention to what the bar finds below the excavated area. Where external decay increases below the excavated area this must be investigated by digging to 400mm, but not beyond as this may destabilise the pole. The problem must be reported if it extends below 400mm. A pole with a significant defect below the bottom of the excavation may also be loose in the ground, and you should be alert for any movement of the pole in-ground when struck with a bar at the base of the excavation.

By testing a pole in the manner described, the point of the bar should penetrate decayed timber to reveal the true extent of the remaining sound timber, or lack there of. Remember that the maximum depth that the point of the rounded point bar penetrates into decayed timber is the depth that the measuring callipers should be placed in order to measure the reduced diameter below groundline 'D_1'. Also, where the pole sounds hollow, the bar should be driven vigorously into the suspect area. This should result in the bar penetrating a thin wall of sound timber or bouncing off if adequate sound timber exists.

This method of testing will identify timber degradation on the external surface of the pole, and internal defects close to the surface of the pole.

It is not necessary to hit the pole excessively hard unless a defect is suspected, in which case you may hit it as hard as you like. A bar with the correct point (5mm radius point) and weighing approximately 6kg, will bounce off sound hardwood timber, but will penetrate defects existing close to the surface of the pole. This procedure is critical to ensuring confidence in the soundness of the pole.

Where Glyptotermes Sp termites have infested a pole, flight holes will almost always be in evidence in the groundline region. After the pole has been scrapped clean below ground, the wood around several flight holes should be further scrapped to remove several millimetres of wood to reveal whether the gallery takes a 90° turn shortly after entering the wood – this is evidence they were the result of Glyptotermes. Glyptotermes Sp termite damage should also be reported to the Supervisor / Contract Officer for further assessment. Where doubt exists, Distribution Engineering Mains Services should be contacted for assistance.

3.3.3.8 Additional Internal Inspections

Perform any additional internal inspections following testing with the rounded point bar, in accordance with Section 3.3.2.3. Where Glyptotermes Sp termites are suspected, it is critically important that the internal inspection be carefully carried out to confirm the sound timber wall thickness in case the pole is near collapse.

3.3.3.9 Sapwood Removal Below Ground

Any sapwood remaining on the below ground surface of the pole (except full length pressure treated poles including CCA and creosote) must be fully removed unless it is firmly attached to the pole and cannot be cut away without damaging the heartwood. Where sapwood is firmly attached to the pole and not fully removed it may be necessary to shape the sapwood so as to ensure the preservative bandage can make even contact with the pole surface. Where hollows or splits exist the pole surface must be treated in accordance with Section 3.3.6.7. All sapwood below G/L on non-CCA treated poles that is not firmly attached to the pole MUST be removed. This includes sapwood where decay exists between the sapwood and the heartwood – this must be removed completely from the below G/L area, or back to the point where there is no separation between the heartwood and sapwood. Where a separation has occurred between the sapwood and heartwood, moisture will be retained and it may hide fungal decay or termite activity.

3.3.3.10 Fungal Decay Below 350mm

If the timber pole is affected with fungal decay at a depth greater than 350mm, continue excavation to a depth of 400mm. If decay is found below 400mm, immediately report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet (see Section 6 and Appendix D).

3.3.3.11 Reduced Diameter Measurement D_1

Measure the minimum external diameter of the pole below groundline using callipers, in accordance with Section 3.3.4.3, to determine if there is a reduction in diameter due to decay. Calculate the pole's residual strength using this reduced diameter (D_1), the original diameter (D_0), and the internal defect size (d) from the internal inspection drill.

Notes: **1.** An accurate assessment of the reduced diameter measurement 'D_1' is critically important in correctly assessing the pole's current strength and must be done strictly in accordance with Section 3.3.4.3.

2. Where the original pole diameter 'D_0', which is an average figure, is less than the maximum internal defect size 'd' (which may occur on an oval pole with a thin wall), measure 'D_0' in the same axis as used to measure the internal defect size 'd', and use that figure for 'D_0', rather than an average figure, when calculating residual strength.

3.3.3.12 Reporting Dangerous Poles

Any pole that appears to be loaded close to or beyond its available capacity, or appears to be in danger of collapse, must be reported immediately to the Ausgrid Supervisor/Contract Officer/Customer Supply Office, to ensure appropriate action is

taken. Complete a Defective Pole Action (DPA) Sheet (see Section 7 and Appendix D).

3.3.3.13 Preservation Treatment of Pole

Remove any pieces of wood, paper or grass from the excavated hole, as this material disrupts soil compaction and may promote termite activity. Rocks bigger than 50mm diameter must be removed and not placed back into the inspection area around the pole.

Carry out preservative treatment in accordance with Section 3.3.6. Seal all inspection holes drilled as part of this inspection with a Blue PP12 plug and seal all other existing inspection holes with Black PP12 plugs, except inspection holes for reinforced poles, which are to be sealed with Grey plugs.

Note: All inspection plugs fitted underneath the External Preservative Bandage must be installed flush with the pole so the bandage can lay flat against the pole and not be pushed away from the pole's face by protruding plugs. 16mm abaxially drilled treatment holes must be sealed with Black PP16 plug PP16 Treatment hole plugs do not need to be installed flush.

Stockcodes

Item	Stockcode
Blue 30mm long 16mm by 10mm taper - Preschem 01 PP12	179451
Black 30mm long 16mm by 10mm taper - Preschem 01 PP12	179052
Grey Plug	Special order
Black Preschem PP16 30mm long 18mm by 14mm taper (with sealing lip)	66084

3.3.4 Measuring and Calculating Pole Diameter

3.3.4.1 Measurement of Original Diameter (D_0)

Different measurements are needed for poles with and without full-length preservative treatment. The Original diameter of a pole is a measurement of the pole's diameter which only includes wood that will continue to contribute to the strength of a pole over time.

Use one of the following procedures to obtain the original diameter (D_0) of a pole:

- **Full-length Preservative.** With full-length preservative (Pressure Impregnated) poles, the sapwood is counted as part of the pole. Do not remove it unless it has rotted. Include all sapwood in your measurements.

Note: There are a small number of poles (approximately 59 poles with a 2003 year disc which were only installed in the Oatley district area) that have been desapped by machining to an 8 or 16 sided shape but have been through the CCA treatment process. These poles must be treated as non CCA impregnated desapped durable poles because without the sapwood to retain the chemical there can be no effective protection for the pole.

- **Without Full-length Preservative.** In poles without full-length preservative treatment only heartwood counts in the strength assessment. Do not include sapwood in the measurements. Remove the sapwood if it has begun to detach, along with all decayed or partially decayed wood.
- **Desapped Durable Species Poles.** Desapped durable species poles are machine dressed to an 8 sided shape on the lower section of the pole and 16 sided on the upper section of the pole. They should have been fully desapped and their strength calculated on their nominal groundline diameter measurement. Therefore even if some sapwood is evident on the pole, the D_0

measurement should include that remaining sapwood because it was included in the original measurement to determine the poles capacity. However, no sapwood is to be included in the reduced diameter D_1 measurement because it has no durability below ground line and will quickly deteriorate.

When measuring a pole's original diameter (D_0) you must measure the average diameter of the pole at or around groundline. Where sapwood is being discounted from the measurement, the most accurate D_0 measurement is taken just below where the sapwood finishes, provided the heartwood has not deteriorated. This may not occur above groundline.

Where the thickness of sapwood cannot be readily determined from observation, allow 20mm for the thickness of sapwood around the pole (40mm allowance in diameter). The original diameter measurement shall be measured using a diameter tape. If for any reason this is not possible, outside callipers shall be used where two measurements of the pole's diameter are to taken 90° apart. The two readings are then averaged in order to give an average diameter (See Figure 3.3.4 5). When using a diameter tape, ensure that your measurement is not affected by attachments such as UGOH's, earth leads, battens, and conduits.

3.3.4.2 Oval / Sea-gull Shaped Poles

Where a pole is or has become oval or 'sea gull' shaped at ground line which leads to diameter measurements that result in a residual strength figure that is clearly too low, the original diameter measurement used in this instance should be taken in the same axis as the reduced diameter. This will result in a more accurate strength figure for this type of pole.

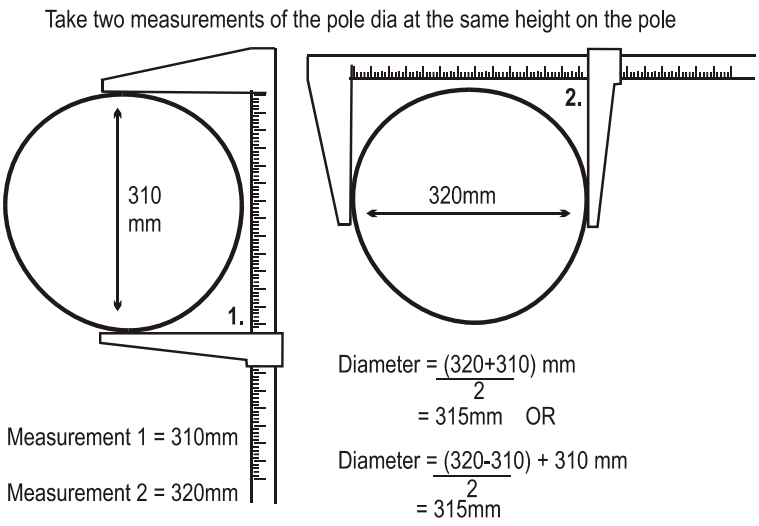


Figure 3.3.4.5: Measuring and Calculating Average Pole Diameters

Note 1: All measuring instruments used to measure a poles diameter or internal defect size, such as callipers, measuring tapes, probes etc, - must be of commercial quality, capable of providing measurements to an appropriate degree of accuracy and should be regularly calibrated against a known standard where necessary. Work carried out using substandard or out of calibration measuring equipment is not acceptable.

Note 2: Where the below ground line diameter is actually greater than the above ground line diameter due to the taper of the pole, report the reduced diameter D_1 as being the same as the original above ground line diameter D_0. For the purpose of calculating residual strength, the reduced diameter D_1 can never be greater than the original diameter D_0.

3.3.4.3 Measurement of Reduced Diameter (D_1)

A timber pole in ground contact commonly suffers external timber degradation in what is termed the 'critical zone', which extends from ground line to approximately 350mm below ground line. This zone of the pole also suffers the most stress when the pole is loaded either by conductor or wind loading.

In calculating a pole's residual strength, the most important measurement is the minimum diameter of the pole in the critical zone. A 20% reduction in a pole's diameter in the critical zone will reduce the pole's strength by approximately 50%, making the pole almost unserviceable.

Therefore in assessing a pole's residual strength it is extremely important that the pole's below ground diameter be accurately measured. The below ground diameter measurement is not to be an average figure, but the MINIMUM diameter that can be measured in any axis and at any level across the pole, between ground line and the bottom of the excavation. This will give you the strength reduction, in the axis with the smallest diameter, compared to the assessed strength of the pole when new which is determined by average diameter measured at nominal ground line.

When measuring the reduced diameter D_1, you must use a measuring instrument capable of measuring across a pole that can take into account bites and hollows in the pole, such as outside callipers. A suitable calliper for this task is manufactured by Harrybilt Engineering and Welding Services in Ballarat telephone 03 5339 4859 Part No. 0-600. (see photo below)

Before measuring the reduced diameter below ground line it is critically important that all decayed timber be removed so that only sound timber is measured. Pockets of soft rot must be removed so the callipers can accurately measure the sound wood diameter.

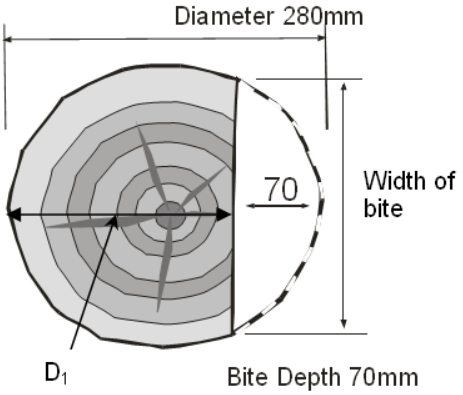
Figure 3.3.6: Outside Callipers Suitable for Measuring the Reduced Diameter of Poles. Range from 0–600mm

3.3.4.4 Measuring Reduced Diameter (D_1) where 'bites' Exist Above or Below Ground, and Calculating Residual Strength

Sections out of the side of the pole can sometimes be found missing due to vehicle impact or the action of decay or termites. Where a 'bite' is found at any level in the pole inspection area, diameter measurements must be taken and a strength calculation carried out. Where a bite occurs in a pole, the reduced diameter D_1 is measured using callipers and the bite size calculated bite depth = D_0 (at or about that location) – D_1.

Measure and record the sound wood diameters. Measurements of sound timber are used to establish the strength of the pole. Reductions in below ground diameter due to pockets of soft rot must be measured using callipers so an accurate minimum diameter can be measured.

3.3.4.5 Measurement of Reduced Diameter where 'bites' Exist

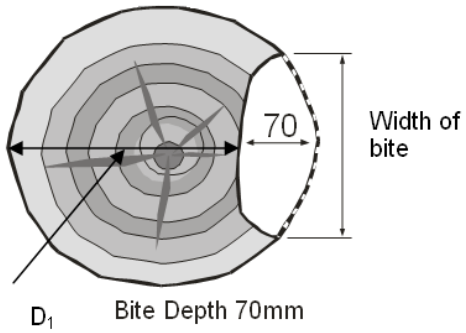


The original diameter of the pole at the site of the bite must be measured below the bite and in the same axis of the bite as shown.

D_1 = 210mm as measured with callipers

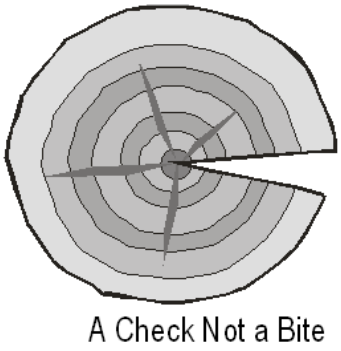
Bite depth = $D_0 - D_1$ = 70mm

Bite depth and width must be reported as part of the inspection.



This situation is to be treated exactly the same as that above.

Although the bite may not extend completely across the pole, for the sake of simplicity, the pole's strength will be assessed as though it does. The resultant strength may therefore be conservative, however Ausgrid will take this into account when determining what action to take.



Splits and Checks are NOT bites and there is no loss of timber from the pole. For the purposes of residual strength calculations, Splits and checks do not reduce the strength of the pole.

3.3.5 Formula Calculations – Timber Poles

$$S = \frac{D_1^4 - d^4}{D_0^3 \times D_1} \times 100$$

All measurements should be in metres

Circular Poles

The formula for calculating the *residual strength* or *remaining strength* (S) of a circular pole is given opposite:

***S* –** is the strength of the pole given as a percentage of the original strength

***D_0* –** represents the original diameter of the pole.

***D_1* –** represents the smallest diameter of the pole usually at or just below ground line.

***d* –** represents the diameter of any internal defect.

$$S = \left(\frac{L_1}{L_o} \right)^3 \times 100$$

All measurements should be in metres

Square Poles - where the reduced cross-section is square

The formula for calculating the '*residual strength*' or *remaining strength* (S) of a square pole, where the degraded section retains a square profile, is given opposite:

S – is the strength of the pole given as a percentage of the original strength

L_o – represents the original width of the square section pole

L_1 – represents the reduced width of the square section pole

$$S = \frac{1}{1.69} \left(\frac{D_1}{L_0} \right)^3 \times 100$$

All measurements should be in metres

Square Poles - where the reduced cross-section is circular rather than square

The formula for calculating the *residual strength* or *remaining strength* (S) of a square pole, where the degraded section has a circular profile, is given opposite:

S – is the strength of the pole given as a percentage of the original strength

L_o – represents the original width of the square section pole

D_1 – represents the reduced cross-section of the pole expressed as a diameter

Note: A 175mm square section post that has its cross-section rounded off due to degrade such that its cross-section diameter is now 166mm, will have 50.5% remaining strength. It can therefore be seen that the corners of the post provide significant strength, and where degrade results in rounding off of the cross-section of the post, significant strength loss will result.

3.3.6 Treatment and Preservation of Poles

3.3.6.1 Mandatory Training

To apply pesticides around Power Poles it is a requirement for personnel to satisfy the following requirements:

Schedule 2, part 2 of the exemption order No. 004/12 (see Appendix E) requires - The person so authorised to use the pesticides to control termites and treat timber, in accordance with this exemption must:

- be not less than eighteen (18) years of age;
- meet all the relevant current requirements of the Pesticides Regulation 2009 including pesticide use notification and record keeping requirements;
- have attained the relevant chemical user's qualification issued in accordance with Level 3 of the Australian Qualifications Framework (AQF) such as ChemCert or SMARTtrain that includes units AHCCHM303A – Prepare and apply chemicals and AHCCHM304A – Transport, handle and store chemicals;
- attain the Pole Inspectors Training (TAFE Course No.27510);
- be able to communicate to a level that enables them to perform their duties safely; and
- observe safe work practices at all times whilst using the pesticides and take action to prevent any person being placed at risk.

Notes:

1. TAFE Course No.27510 is available through OTEN, and may only be available through OTEN, unless the RTO develops its own training course and has it approved by WorkCover. This course does not require training to be repeated after a period of time.

2. Under the Pesticides Amendment Regulation 2009 – the Smarttrain/Chemcert qualification lasts for five years after which the course must be undertaken again.

All trained personnel shall carry evidence of the prescribed qualification or training.

3.3.6.2 Bore Hole Sterilisation – Boron/Fluoride Polesaver Rods – 10mm Diameter

Boron/fluoride rods are solid rods with active constituents of elemental boron and fluoride, and are manufactured as slow release wood preservatives for the control of fungal decay in structural timbers. The rods used for sterilisation of bore holes are 10mm in diameter.

These rods are to be used to prevent the contamination of poles with fungi that may be introduced through drilling a hole for inspection.

Up to three rods are to be placed in each hole in the pole, to ensure each hole is fully charged, including those holes drilled on previous inspections and sealed with Black PP12 plugs or a Blue PP12 plug for the most recent inspection hole (holes sealed with Grey plugs must not be treated with boron/fluoride rods).

Stockcodes

Item	Stockcode
Blue 30mm long 16mm by 10mm taper - Preschem 01 PP12	179451
Black 30mm long 16mm by 10mm taper - Preschem 01 PP12	179052
Grey Plug	Special order

3.3.6.3 Heart Rot Treatment – Boron/Fluoride Polesaver Rods – 14mm Diameter

Ausgrid requires heart rot treatment, using 14mm Polesaver Rods, to be completed on specific poles where there is a risk of accelerated deterioration due to internal fungal decay. These rods are installed into the outer annulus of timber immediately below groundline where they will diffuse into the timber thereby preserving it. The pole must first be abaxially drilled to form cavities to contain the Polesaver Rods. Once these holes have been drilled they are to be charged with 2 x 14mm Polesaver Rods per hole, and recharged at every subsequent maintenance inspection.

3.3.6.4 Conditions Required for Abaxial Drilling to be Carried Out:

Poles that are to be abaxially drilled must:

- have internal decay, or
- have active subterranean termites, or (See Note 1 below)
- be of a less durable timber species (See Note 2 below)

Poles are NOT to be abaxially drilled if they have:

- a significant diameter reduction below groundline,(if there is a significant below ground diameter reduction, the timber that we are trying to protect has already been lost), or (See Note 3 below)
- been previously abaxially drilled, or (See Note 4 below)
- a ground line diameter, D_0 measurement, of less than 220mm, or

- a residual strength figure below 50%, or
- a wall thickness (dimension 'A' or 'D_1 – B' on Defective Pole Action Sheet) of less than 70mm (at or below groundline). (See Note 5 below)

3.3.6.5 Notes on Requirement for Abaxial Drilling

Note 1: If the initial termite treatment is a liquid termiticide, the heart rot treatment is to be applied as part of the initial pole inspection. If the termite treatment is a dust or bait then the heart rot treatment is to be applied as part of the follow-up pole inspection.

Note 2: Less durable timber species in this context fall into one of the following categories - (these poles may be identified in SAP):

Pole Type	Species	Ausgrid Region/District
Dressed	Class 2 (see below)	All
Creosote Impregnated	Class 2 (see below)	All
CCA	Blackbutt	All
Natural Round	Class 2 (see below) Unknown	All All
Unknown	All	All

Class 2 timber species include (but are not limited to):

Species	Abbrev.	Species	Abbrev.
Blackbutt	BB	Southern Mahogany	SM
Box Brush	BH	Southern Blue Gum	SO
Brown Stringybark	BS	Silvertop Ash	ST
Forest Red Gum	FR	Sydney Blue Gum	SY
Red Mahogany	RM	White Stringybark	WS
Red Stringybark	RS	White Box	WX
Spotted Gum	SG	Yellow Stringybark	YS

Note 3: The diameter of the pole below groundline must not have suffered a reduction of 40mm or more (20mm or more reduction in radius). Any sapwood overhanging the below ground inspection area is to be removed as per Section 3.3.3.9 so the heartwood underneath can be properly inspected and the D_1 reduced diameter measurement more accurately determined. Polesaver rods are designed to preserve the life of the pole by protecting the outer annulus of timber in the critical zone from biodegradation. Where diameter reductions are encountered as described above, the timber most required for the pole's strength has already been lost, and there is an increasing risk of an abaxial angled hole being drilled out through the side of the pole.

Note 4: Poles are never abaxially drilled more than once with 3 or 4 holes installed for the purpose of carrying out heart rot treatment. However, if a pole with two diametrically opposing axially or abaxially angled holes have been previously drilled, one or preferably two additional abaxially angled holes should be drilled where conditions and obstructions allow.

Note 5: Poles must have sufficient wall thickness so the abaxially drilled holes will remain in sound timber over their full length. The shape of the pole will affect how much sound timber is required. For example, an oval shaped pole will require a greater thickness of sound timber to remain in good wood in some locations more than others on the pole.

3.3.6.6 Abaxial Drilling and Rod Installation

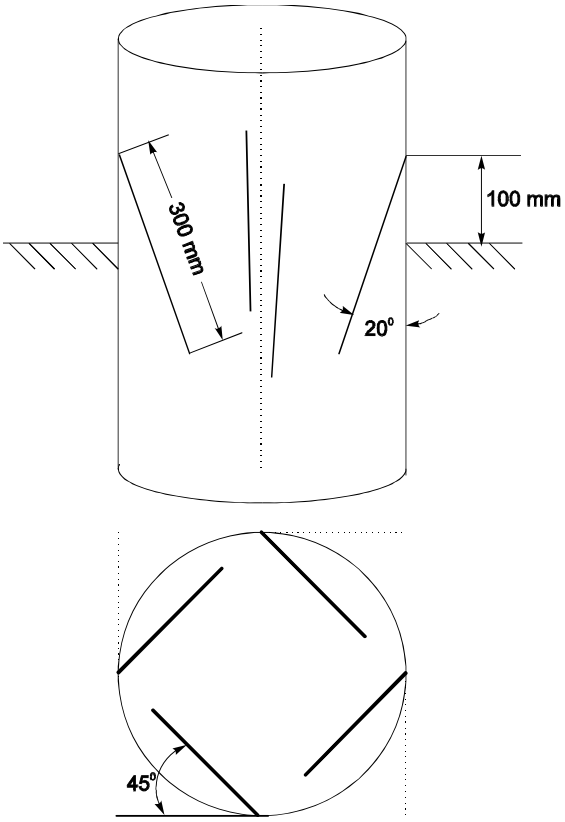


Figure 3.3.7 Abaxial Drilling and Rod Installation

Procedure:

1. Using a 16mm drill bit:
   (i) drill four holes, 90° apart, at a height of 100mm above actual groundline at each point – (height around the pole will vary on sloping ground) in either a clockwise (as shown above) or anti-clockwise direction. It is important to maintain the same clockwise or anti-clockwise direction where possible, to ensure an even distribution of preservative.

   (ii) drill at 20° to the vertical axis of the pole and

   (iii) 45° to the tangent of the pole.

   Note: The Boron/Fluoride Rods used for the control of heart rot are 14mm in diameter.

2. Insert two 14mm boron rods into each hole.
3. Seal the holes with Black PP16 plastic plugs.
4. Treatment plugs are to be driven into each drill hole in such a manner that they seal the hole, but not so far that they are difficult to remove in future.

Stockcodes

Item	Stockcode
Boron/Fluoride Rods 14mm diameter	142018
Black Preschem PP16 30mm long 18mm by 14mm taper (with sealing lip)	66084

For the treatment to be effective in preserving the outer annulus of timber, the drilled holes MUST be in accordance with the angles set, that is 20° to the vertical and 45° to the tangent of the pole. The drilled holes must end in solid wood and be located in the outer wall of timber which provides the majority of the pole's strength.

NO MORE THAN 4 HOLES ARE TO BE DRILLED FOR THIS PURPOSE UNDER ANY CIRCUMSTANCES.

The above mentioned 4 holes for heart rot treatment shall only be drilled once in the life of the pole, however where heart rot treatment holes have previously been drilled, each hole must be re-charged with two 14mm rods at each inspection.

Natural round poles may require the removal of loose sapwood from around the location where abaxial holes are to be drilled. If not removed it may be difficult to drill holes at the correct angles and contribute towards the breakage of drill bits.

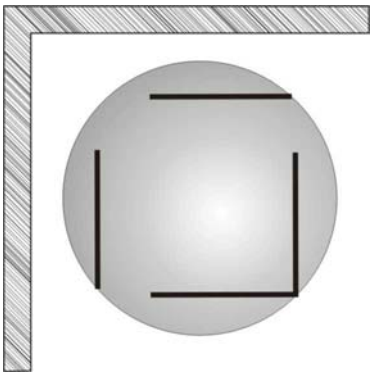


Figure 3.3.8 Fence or Wall Obstruction

Where an obstruction such as a fence or wall prevents drilling all holes in either a clockwise or anti-clockwise direction, the direction of drilling should be altered to suit the situation, as shown opposite.

If a bite exists below ground, it may still be possible to abaxially drill the pole by commencing both holes immediately above the bite and angling the holes away from the bite below groundline.

3.3.6.7 Remedial Treatment - External Preservative Bandage

Ausgrid requires an external preservative Bandage Softrot treatment to be completed on all timber poles at each maintenance inspection following first installation, except CCA non-Blackbutt species poles which do not require excavation and treatment for the first 15 years from the date marked on the pole disc.

The external preservative Bandage is available in two forms:

- Preschem Bioguard Bandage, and
- Ausmose 'Ausplast' Wrap – (Product code APROLL20.

Both perform the same function but have different characteristics, and by using the most appropriate product in a given situation, Ausgrid will gain the best value.

An External Preservative Paste (Product code AUSCART) is also available and supplied in cartridge form for direct application to the pole. It shall be used on areas of the pole which cannot directly contact the external preservative bandage such as splits, checks, cavities or hollows.

Stockcodes

Item	Stockcode
Preschem Bioguard Bandage	150367
Ausmose 'Ausplast' Wrap (Product code APROLL20)	179462
External Preservative Paste (Product code AUSCART)	179471

Preschem Bioguard Bandage

The Bioguard Bandage is a plastic rap of discs or pills of slow release wood preservative. The plastic rap is preformed into individual round recesses, within an impervious PVC matrix.

The slow release wood preservative contains boron and fluoride and is identical in composition to the boron / fluoride rods. The active ingredients diffuse from the bandage into moist timber. The chemical penetrates the heart wood of the pole by ionic diffusion and will provide long term protection of the timber against fungal decay once fungi-toxic levels are reached. Boron / fluoride does not act as termiticide, however termites will not touch timber impregnated with Boron / Fluoride.

PVC chemical resistant gloves are necessary when handling the Bioguard Bandage or Preschem preservative rods. The Bioguard Bandage MUST be placed below ground.

Ausmose 'Ausplast' Wrap

The Ausplast active ingredient consists of Sodium fluoride only. It contains no Boron, unlike the Preschem product, and the active ingredient is blended with a waterproof paraffin oil base to the consistency of a stiff paste which is a light brown colour with a slightly oily odour. It is supplied coated onto a biodegradable plastic coated paper wrap. Ausplast works in the same manner as Bioguard.

Ausplast does not dissolve when submerged in water where the active constituent continues to slowly release from the paraffin oil base in a controlled manner. This makes it suitable for situations where periodic water inundation may occur.

CAUTION

Sodium Fluoride is an S6 scheduled poison. Oil resistant gloves and boots are necessary when handling Ausplast. Contaminated clothing requires washing after each day's use. Ausplast MUST be placed below ground.

Additional Requirements when applying an External Preservative Bandage

Never run the bandage around earth wires or underground services. If the bandage cannot be run under these services simply butt the bandage up to the obstruction to ensure contact always exists between the bandage and as much of the pole's surface as possible.

Where a pole has sapwood down to groundline (as often seen on natural round poles), it must be removed in accordance with Section 3.3.3.9. When cutting away sapwood, be particularly careful not to damage the heartwood beneath.

An External Preservative Bandage is not to be applied to reinforced poles.

3.3.6.8 Preferred Treatment - Bioguard Bandage

Bioguard Bandage is the preferred treatment and should be used in all situations except where:

- there is free ingress of water into the excavation, or
- the shape of the below ground face of the pole is not smoothly cylindrical and the bandage cannot make proper contact with the full surface of the pole face.

- where there are numerous UGOH's or other attachments to the pole.
- steeply sloping ground.

In these instance Ausplast may be used.

Ausplast has the ability to conform more easily and to adhere to irregular shaped surfaces, and is thus more effective where Bioguard cannot be made to sit flat against the pole face. This situation commonly arises where fungal decay or termites have degraded the below-ground face of the pole making it very uneven. This causes the Bioguard bandage to only make contact on the high points which limits the transfer of the preservative to the timber and allows it to wash out of the bandage.

CAUTION
Ausplast should be used in all 'wet' situations. However NO TREATMENT is to be applied in areas where it could enter water catchments, in or near water bodies, or such that they are likely to enter a waterway or drain. All pesticide applications must be in accordance with the relevant Acts and Regulations.

Procedure - Bioguard

1. Scrape the pole to remove soil build up and any external decay.
2. Using a stiff brush, remove any excess soil from the pole.

Note: Where plugged inspection holes are located in the area to be covered with the Bioguard Bandage, plugs must be driven flush to ensure the Bandage is not held away from the pole surface.

3. Inject preservative paste into any splits, checks, cavities or hollows under the area to be covered by the bandage.
4. Measure the pole circumference at the widest point below groundline.
5. Measure and cut the Bioguard Bandage to allow 10-20mm overlap.
6. Position the bandage 50mm below the true groundline. When the installation is complete and the soil has settled, no part of the bandage or the PVC tape must be visible above ground.
7. Staple the trailing edge of the bandage to the pole. Wrap the leading edge around the pole and staple in place. The bandage must be in even contact with the pole surface over its full coverage to be effective.
8. Tightly wrap the top edge of the bandage with two layers of 50mm wide PVC tape such that the tape half overlaps the top edge of the bandage and seals against the pole.

Note 1: On steeply sloping ground where the Bioguard bandage is 50mm below groundline on the low side and 150mm or more below ground on the high side, a piece of Ausplast external preservative bandage is to be cut to shape and fitted above the Bioguard bandage on the high side of the pole.

IMPORTANT
No part of either bandage is to be visible above groundline at any time.

The section of Ausplast bandage should be installed before wrapping two layers of 50mm PVC tape around the top of the Preschem bandage. There is no need to seal the top of the Ausplast bandage with PVC tape.

Note 2: When removing the old bandage, all residue or spilt chemical tablets are to be put back into the hole. Bioguard bandages that contain no residue from the chemical tablets may be disposed of in landfill areas approved by the Environmental Protection Agency. Where an undepleted Bioguard Bandage is removed, the removed bandage is to be returned to Chullora warehouse in an approved bag for recycling.

3.3.6.9 Procedure – Ausplast

CAUTION
Ausplast should be used in all 'wet' situations. However NO TREATMENT is to be applied in areas where it could enter water catchments, in or near water bodies, or such that they are likely to enter a waterway or drain. All pesticide applications must be in accordance with the relevant Acts and Regulations.

1. Scrape the pole to remove soil build up and any external decay.
2. Using a stiff brush, remove any excess soil from the pole.

   Note: Where plugged inspection holes are located in the area to be covered with the Ausplast Bandage, plugs must be driven flush to ensure the Bandage is not held away from the pole surface

3. Inject preservative paste into any splits, checks, cavities or hollows under the area to be covered by the bandage.
4. Measure and cut one or more pieces of Ausplast Bandage and peel off the plastic liner. Place the plastic liner in the supplied black plastic bag. Place the bandage against the pole with the paraffin side facing the pole such that the bandage comes no closer than 50mm to finished groundline. There is no need to staple or tape the bandage in place. Ensure the full circumference of the pole is covered by slightly overlapping any joins. A large overlap is no problem other than a waste of material, but joins must overlap to ensure full coverage.

   Note: On steeply sloping ground where the Ausplast bandage is 50mm below groundline on one side and 150mm or more below ground on the high side of the pole to more adequately protect the pole, a piece of Ausplast is to be cut to shape and fitted above the first section of bandage on the high side of the pole.

IMPORTANT
No part of either bandage is to be visible above groundline at any time.

5. Ensure the bandage is pressed firmly against the pole and into any dips and valleys so as much of the pole's external face is covered as possible.

   Note: The bandage is biodegradable and no waste is expected to require removal at subsequent inspections. The plastic liner and any other waste should be placed in the black plastic bag supplied and disposed of in general waste.

3.3.6.10 Remedial Preservative Treatment – CN Timber Oil – (Copper Napthenate Paint)

Copper chrome arsenate (CCA) impregnated poles which have been damaged or scarfed above groundline (eg by a vehicle), removing the CCA impregnated sapwood, are to have the damaged area cleaned up and any loose material removed. The wound is to be treated with CN Timber Oil – (Copper Napthenate paint. Stockcode 146332). Any below groundline damage shall be treated with Ausplast preservative paste.

Any above ground locations within the pole inspection area where the CCA treated timber has been damaged, such as where burnt CCA material has been cleaned off, are to be recoated with CN timber oil at each maintenance inspection.

3.3.6.11 Treatment of Knots Holes, Grub Holes and Barrel Checks

All hole defects must be probed to discover the extent of any decay. All decay must be removed and the knot or grub hole scarfed on the bottom to allow excess moisture to run out. Ausplast preservative paste is then to be injected from a cartridge into the defect so the internal surface has about a 2mm coating over the whole surface. The defect must be then sealed with a petromastic compound. Old

equipment holes in the inspection area shall be treated with Preschem rods and sealed with plastic plugs or sealant.

Barrel checks (vertical splits) must not have any petromastic sealant or preservative paste applied. They must not be obstructed by debris which can trap moisture internally, thereby promoting fungal decay. Where petromastic sealant is found in barrel checks, it MUST be removed.

3.3.6.12 Handling Precautions

When handling Boron/Fluoride Rods, Bioguard Bandage, Ausplast, Xtroll and CN Timber Oil (Copper Napthenate paint), precautions should be taken to avoid contact with the skin and eyes, and synthetic rubber/PVC gloves must be worn. In addition, when handling CN Timber Oil (Copper Napthenate paint), eye protection must be worn and the paint applied with a brush.

You must also refer to the Material Safety Data Sheet for these products.

3.3.7 Defective Timber Poles

If you assessed the timber pole as a defective pole, then complete a 'Defective Pole Action' sheet (see Section 7 and Appendix D) and mark the pole in accordance with Section 3.3.9.

3.3.7.1 Assessment for Reinforcement

All timber poles classified as defective shall be assessed for reinforcement by having wall thickness measurements taken at 200mm, 800mm and 1000mm above groundline, generally in the neutral axis, or in such location as sounding indicates.

The wall thickness values must be within the values specified in Utility Asset Management's Technical Manual reproduced in Section 3.4.4.2, with the additional requirement of a minimum wall thickness of 30mm at any point 200mm above ground, as specified in 'Assessment criteria' in Section 3.4.4.2.

DO NOT treat these inspection holes with Preschem pole saver rods; only seal with Grey plastic plugs.

If inspection holes sealed with Grey plugs already exist you may use them to take your measurements and should not drill additional holes, UNLESS sounding indicates a more significant defect elsewhere in which case you should drill an additional inspection hole at that location.

Stockcodes

Item	Stockcode
Grey Plug	Special order

Results of these internal inspections are to be recorded on the 'Defective Pole Action' sheet, and entered into SAP (see Section 7 and Appendix D).

Note: If a pole appears to be loaded close to or beyond its available capacity, or appears to be in danger of collapse, it must be reported immediately to the Ausgrid Supervisor/Contract Officer/Customer Supply Office to ensure appropriate action is taken.

3.3.8 Restoration of Excavation

When restoring the excavated area around poles it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Rocks bigger than 50mm diameter, vegetation or creosote-impregnated soil are to be removed from the backfill material, and together with any wood shavings resulting from inspection and/or treatment procedures, shall be removed from site and disposed of lawfully. All spoil that needs to be removed from the site shall be

managed as per NUS174C Environmental Procedures – Environmental Handbook for construction and maintenance. If additional information is require please contact Environmental Services.

Under NO CIRCUMSTANCES is vegetation to be placed in the excavation and covered with soil.

3.3.8.1 Unpaved Areas

In unpaved areas the inspection area around the pole is to be restored with the backfill material. Backfill the excavation in layers of 100mm, ramming each layer so as to firmly compact the soil until fully reinstated. Take care not to damage the external preservative bandage. The material is to be firmly tamped with a suitable tool so that it finishes slightly below ground line. The top surface is to be then finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline. The black sealing tape of the bandage must not be visible above groundline. Where turf has been removed to allow excavation, it shall be neatly reinstated on top of the compacted soil.

The work area is to be cleaned with a broom and all surplus material removed from site.

Sandy loam shall be used in all residential areas.

On private properties in rural areas, local soil found on site may optionally be used for surface reinstatement around the pole rather than importing clean sandy loam to site. The local soil may be used where:

- property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

Note: The surrounding area must be left in an ‘as found’ condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and pot holes be created that may present a hazard.

3.3.8.2 Paved Areas

The inspection area around the pole is to be reinstated with 50mm thick cold bituminous pre-mix material (see Figure 3.3.9) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

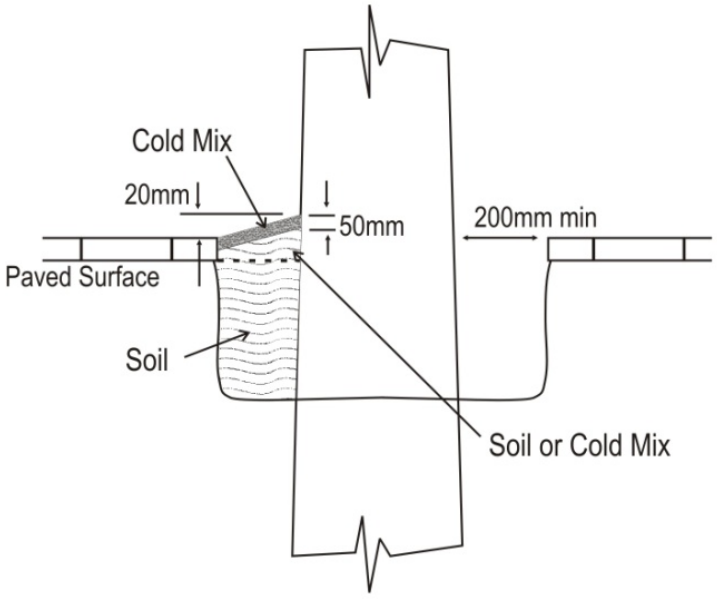


Figure 3.3.9: Cold Mix Installation

The backfill material is to be firmly tamped with a suitable tool so that it finishes approximately 50mm below the level of the pavement and all excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving. The bituminous pre-mix material is to be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence. The work area is to be cleaned with a broom and all surplus material is to be removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being carried out.

3.3.9 Marking Defective/Condemned Poles

Defective / condemned poles will be marked by the attachment of a single orange coloured 70mm wide band. This orange band is a safety warning device and it is essential that it be correctly installed so that it cannot be interfered with or become dislodged.

Defective / condemned poles are to be identified as follows (Refer Figure 3.3.10):

- Defective Poles – A single 70mm wide orange band secured around the pole at least 2.4m above ground but below 3m, encircling the whole pole, marked with Black “X X X”s and Ausgrid’s name and logo.
- Condemned Poles – A single orange band as for defective poles, plus a permanently marked “X” painted 1.8 m above ground on opposite sides of the pole (eg on the roadside and footpath faces) with the slashes of the “X” at least 500mm long, using the approved white paint (Stockcode 176429).

Note: Defective poles suitable for reinforcement can be marked with the orange band that may then be removed after reinforcement has taken place.

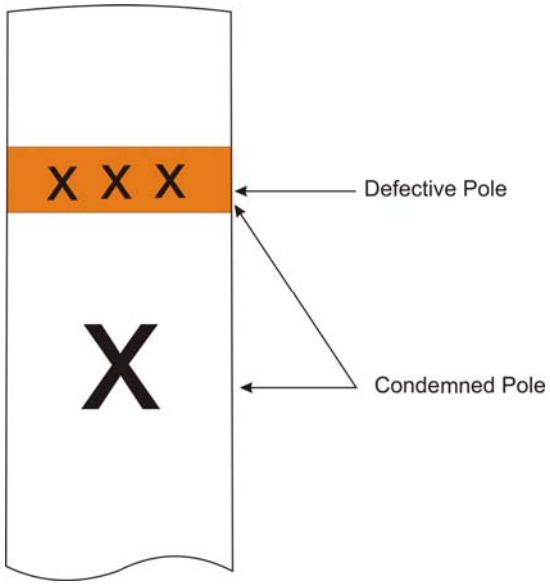


Figure 3.3.10 Defective/Condemned Pole Markings

3.3.9.1 Types of Marking Bands

There are two types of marking bands (both orange coloured and 70mm wide):

- a 1220mm long PVC plastic strip (Stockcode 180191), suitable for wood poles (shown here), and
- a roll of self adhesive tape (Stockcode 179704) may be applied to any pole but is most suitable for concrete, fibre composite and steel poles (not shown here).

3.3.9.2 PVC Plastic Strip

The PVC plastic strip, shown in Figure 3.3.11, is designed for use on timber poles, and is simply nailed to a timber pole using 40mm twist nails.

Figure 3.3.11 PVC Plastic Strip

To install the PVC plastic strip:

Note: This is a safety device and correct installation is critical.

1. Place the orange strip around the pole at the designated height, with the company logo correctly orientated, and fix in position using 40mm twist nails.
2. For large diameter poles it will be necessary to fit an additional length of plastic strip to ensure that an orange identification band fully encircles the pole.

3.3.9.3 Stockcodes

Item	Stockcode
1220mm long, 70mm orange PVC plastic strip	180191
White paint (approved)	176429
40mm twist nails	175912

3.4 Reinforced and Rebutted Poles Inspection

REINFORCED TIMBER POLE INSPECTION FLOWCHART (Fig 3.4.1)

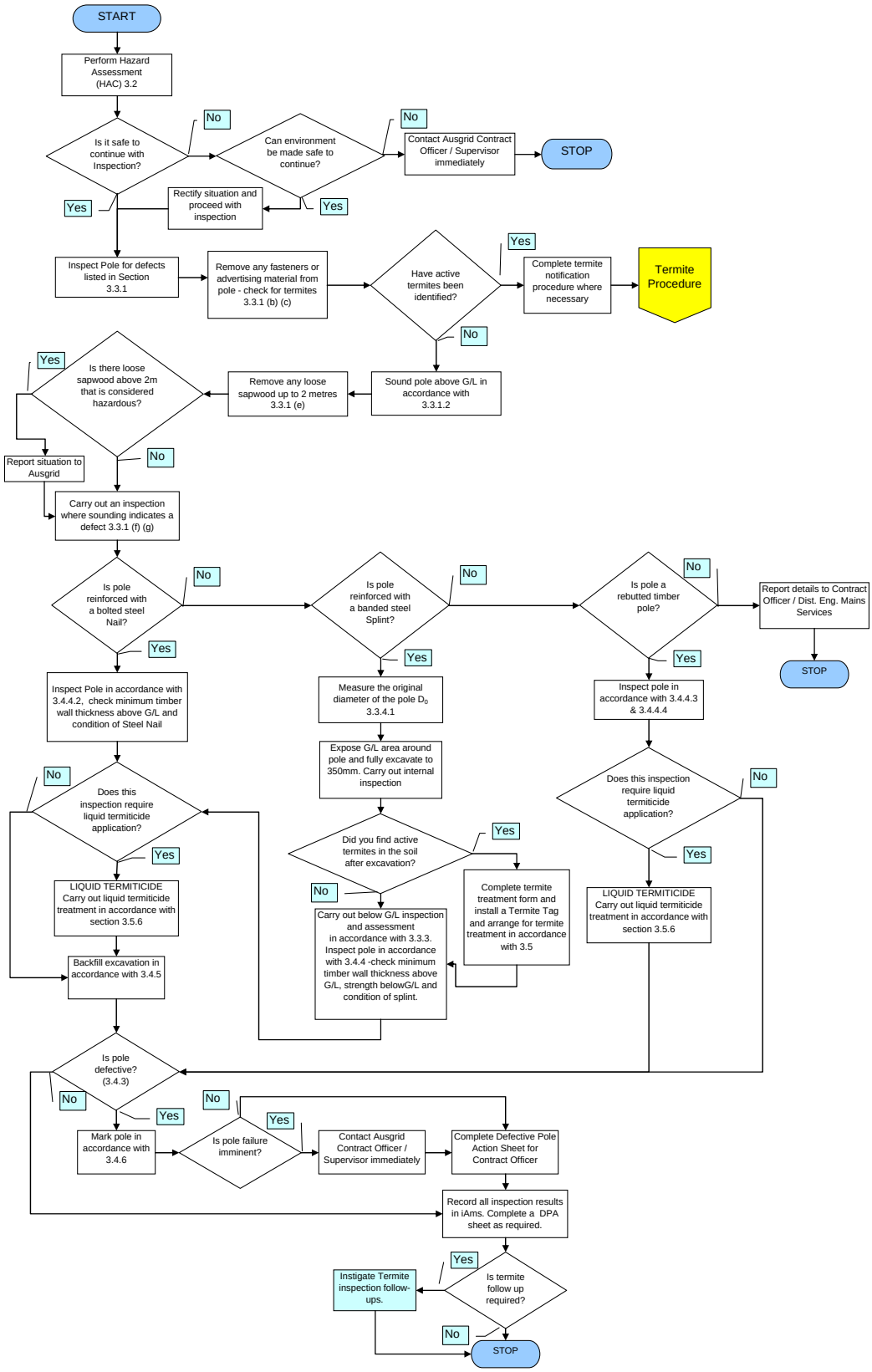


Figure 3.4.1 Reinforced Timber Pole Inspection Flowchart

3.4.1 Requirements

Ausgrid's policy is to reinforce defective poles, where possible, by raising residual strength back up past 50%.

Poles associated with two pole substations, poles with raiser brackets (excluding OHEW raiser), below ground baulks, or in swampy/tidal areas are not to be nailed, other than as an emergency measure where they may be temporarily nailed.

Pole reinforcement is designed to augment a pole's strength at groundline and assumes that the head of the pole has no significant defects or deterioration. Reinforcement will not generally be suitable for burnt CCA poles unless the damage is confined to an area below 200mm or so above groundline. Damage between 200mm above groundline and 1.5 metres above groundline may make a pole unsuitable for reinforcement because this is where the bolts or bands require sound timber with which to hold the pole. However reinforcement may be suitable in this situation under emergency conditions to temporarily hold a pole until replacement can be organised.

A defective pole can be reinforced provided the pole satisfies all of the following criteria:

- The pole must have a minimum wall thickness of 30mm at 200mm and 60mm at 800mm and 1000mm above ground and the size of the internal defect must continue to decrease further up the pole. Where sounding and subsequent internal inspections above the reinforcement indicate the internal defect is increasing in size, the pole should be replaced. There is no requirement for residual strength or wall thickness at ground line.
- Any termites must be treated – there should be no active termites in the pole.
- The portion of the pole above the nail has no immediately dangerous visible defects reported.
- The installation of the nail must comply with the anti-climbing measures in Appendix F of Network Standard NS 128 'Specification for Pole Installation and Removal'. In general a pole that has been nailed must be free of attachments between 2.4 m and 4.8 m above ground.
- Poles that would normally be climbed for switching purposes need to be readily accessible from an Elevated Work Platform. Examples include link poles and substation poles.

Generally poles being considered for reinforcement, other than in emergency situations, should be in good condition above ground so premature replacement does not occur due to above ground timber defects.

3.4.2 Timber Poles that Cannot be Reinforced

When a defective timber pole cannot be reinforced, due to situational and /or conditional factors, the pole must be condemned and replaced.

3.4.3 When to Replace a Reinforced Timber Pole

3.4.3.1 Splinted Poles

A splinted pole is to be classified condemned if either:

- The minimum average wall thickness of sound timber is less than the 'minimum in-service' values stipulated in the "Minimum Wall Thickness Table" (Section 3.4.4.1), or
- There is a heavy loss of steel from the below ground section of the reinforcement with holes present in the splint.
- The calculated residual strength of the pole is less than 25% and a dangerous situation will be created if pole head movement occurs as a result of below

ground timber failure. For example – a pole situated alongside a busy road may endanger traffic if it were to lean towards the roadway, or conductors crossing a road may be caught by traffic if clearances were reduced by pole head movement towards the roadway.

3.4.3.2 Nailed Poles

The pole is to be classified condemned if:

- The minimum average wall thickness of sound timber is less than the minimum 'serviceable' values stated in Section 3.4.4.2 'Assessment Criteria', or
- There is a heavy loss of steel from the below ground section of the reinforcement with holes present in the nail.

3.4.3.3 Composite Poles

A composite pole is to be classified condemned if:

- there is an internal defect greater than half the diameter of the pole inside or immediately above the caisson, or
- all the inspection holes in the caisson have been used to carry out an internal inspection and there are no other inspection locations remaining.

3.4.4 Inspection of Reinforced poles

Reinforced timber poles are to be inspected similarly to unreinforced timber poles, but with the following differences.

3.4.4.1 Splinted Reinforced Poles

Splinted Reinforced Poles are timber poles that have a steel 'C' section approximately 3.3 metres long driven down beside the pole that is attached to the above ground section of the timber pole by 4 or 6 steel bands. They are inspected above and below ground in a similar manner to unreinforced poles except there is no need to partially inspect because the pole cannot fall to ground provided the splint and securing bands are intact.

The critical area for inspecting splinted poles is near the top of the reinforcing steel. It is essential that adequate sound timber exists in this area. Also pay particular attention to the area of the pole near the top of the reinforcing bands.

Inspect and/or check for the following defects:

- Visually inspect the steel splint for signs for rust or vehicle damage.
- Confirm the bands are tight and free of rust. Report defective banding to the Ausgrid Supervisor/Contract Officer/Customer Supply Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet and enter details into SAP.
- Bore or use existing holes at 200mm, 800mm and 1000mm above groundline to ascertain the remaining good wood. Compare these values with the "Minimum Wall Thickness Table" and general requirements below, and take appropriate action. Where such holes are used to evaluate the remaining wall thickness of the pole – do not charge these holes with Preschem Pole Saver Rods, instead seal these holes with Grey plastic plugs (Stockcode: Special order) to identify their purpose.

A splinted pole is rated serviceable if:

- The minimum wall thickness of sound timber equals or exceeds the in-service minimum values stated in the "Minimum Wall Thickness Table" below.
- There is no visible loss of steel from the below ground section of the reinforcement; and
- The calculated residual strength of the pole below ground is 25% or greater.

Where a splinted pole does not meet the above criteria, it is to be classified as defective. Complete a Defective Pole Action (DPA) Sheet and mark the pole in accordance with Section 3.4.6.

If you consider the pole to be dangerous then immediately report the pole to the Ausgrid Supervisor/Contract Officer/Customer Supply Office to ensure appropriate action is taken.

Minimum Wall Thickness Table

	Minimum wall thickness 400mm below the top of the reinforcement, or at 800mm & 1000mm above groundline		Min wall thickness at location of bottom bands -200mm above groundline	
Pole's Ground Line Diameter (mm)	**At installation (16% + 10mm)**	**Minimum in-service (11% + 10mm)**	**At installation (11% + 10mm)**	**Minimum in-service (6% + 10mm)**
Less than 350	60	40	40	30
350 - 400	66	45	45	31
400 - 450	74	50	50	34
450 - 500	82	55	55	37
500 - 550	90	60	60	40
550 - 600	98	65	65	43
600 - 650	106	70	70	46
650 - 700	114	75	75	49
Greater than 700	122	80	80	52

3.4.4.2 Nailed Reinforced Poles

Nailed Reinforced Poles are timber poles that have a steel 'nail' approximately 3.0 metres long driven down beside the pole, and attached to the above ground section of the timber pole by 4 bolts. They are inspected in a similar manner above ground to unreinforced poles, and there is no requirement to inspect the pole below ground. Excavation around the pole is only necessary to check for corrosion of the nail. Corrosion of the steel will normally be visible at ground line if present, however removal of the top 50mm to 100mm of soil is necessary to properly inspect the condition of the nail.

The critical area for reinforced poles is near the top of the reinforcing steel. It is essential that adequate sound timber exists in this area. Pay particular attention to the area of the pole near the top of the reinforcing steel and the area around and above the two top bolts.

Inspection Procedure

Inspect and/or check for the following defects:

- Visually inspect the steel nail for signs for rust or vehicle damage
- Inspect the pole in accordance with the 'Utility Asset Management's Technical Manual Table' reproduced below.
- Bore or use existing holes at 200mm, 800mm and 1000mm above groundline to ascertain the remaining good wood. Compare these values with the requirements below in 'Assessment Criteria', and then take appropriate action. Where such holes are used to evaluate the remaining wall thickness of the pole – do not charge these holes with Preschem Pole Saver Rods, instead seal these holes with Grey plastic plugs (Stockcode: Special order) to identify their purpose.

Utility Asset Management's Technical Manual Table (reproduced)

Test	Inspection procedure	Things to look for	Resulting Action
VISUAL INSPECTION Every Visit	Inspect from top of Nails to groundline Probe in checks and along edges of the Nails	Look for evidence of termites (mud) and localised rot Look to see if Nails are pulled in tightly against pole Look for evidence of rust on the Nail at groundline	Dig, bore and probe to see if termites are still present Explore the extent of any rot by probing and boring Tighten bolts Excavate
EXCAVATE Every Visit	Dig out all around pole to a minimum depth of 100mm	Live termites in pole. Termite tunnels in soil or on surface of pole. Heavy rust on Nails below ground Does rust extend beyond the bottom of the hole?	Termites to be noted and treatment arranged. Knock off rust. Look to see if there is visible loss of metal thickness or holes Dig down until extent of rust is seen (maximum of 600mm)
SOUND TEST Every Visit	Strike pole repeatedly, all around, at all heights to maximum up reach	Evidence of possible unsoundness Concentrate in the upper 600mm of the Nails	Bore to ascertain extent of any rot
Bore (or use an existing hole) Every Visit	Bore into pole at an angle of less than 20° at any place where suggestion of unsoundness Bore slightly upward to prevent water collecting Existing hole, 600mm below top of Nails can be used to measure sound wood thickness	Depth of sound timber before striking rot	Do not plug hole

Note: Pay particular attention along the edges of the nail for evidence of termite infestation.

A nailed pole is rated serviceable if:

- The inspection results meet or exceed the minimum "serviceable" values stated in the Assessment Criteria below.

Assessment Criteria

A minimum sound timber wall thickness of 60mm applies at installation to all inspection holes drilled / used for assessment at 800mm and 1000mm above ground line. A minimum sound timber wall thickness of 30mm applies at 200mm above ground line.

If a pole meets the above criteria it is deemed suitable to nail.

The nailed pole is classified as condemned if the wall thickness at 800mm and 1000mm above ground line is less than 50mm, or the wall thickness at 200mm above ground line is less than 30mm. If the pole is classified as condemned, complete a Defective Pole Action (DPA) Sheet and mark the pole in accordance with Section 3.4.6.

If a nailed pole meets the above “serviceability” criteria, it is deemed suitable to last another five-year inspection cycle.

If you consider the pole to be dangerous then immediately report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken.

3.4.4.3 Composite Poles

Composite poles consist of a timber pole that has the old in-ground section replaced with a steel reinforced concrete stub and a sliding steel sleeve, or a concrete filled steel caisson (steel tube partially filled with concrete).

In both cases the timber pole is 'joined' to the concrete filled steel tube, or concrete stub with sliding steel tube, by placing the machined down section of the pole into the steel tube (sliding or fixed).

The advantage of the concrete butt is that the pole does not have to be lifted as high, but is more expensive. Use of a caisson will necessitate the pole being lifted 0.8m to 1.35m so that it can then be lowered into the caisson. There are approximately a dozen different sizes of replacement butts depending on the size and rating of the pole to be rebutted.

Inspect and/or check for the following defects:

- Inspect the pole and fittings above the steel sleeve for any signs of deterioration, damage or termites.
- Inspect the machined-down timber immediately above the sleeve for any sign of fungal decay.
- Inspect the timber visible through the three inspection holes for any sign of fungal decay.
- Inspect the drain hole and clear out if blocked. The space between the top of the concrete and the bottom of the pole should be probed through the drainage hole for any signs of deterioration or termite activity.
- Inspect the steel sleeve for any signs of corrosion or termite activity.
- Pay particular attention to the timber within the steel sleeve, and the condition of the steel sleeve itself.

3.4.4.4 Defective Composite Poles

If an internal defect greater than half the diameter of the timber is detected, or if all the locations for internal inspection have been drilled out, then report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet. Mark the pole in accordance with Section 3.4.6.

A serviceable Composite Pole must be suitable to last another five-year inspection cycle.

3.4.5 Restoration of Excavation

When restoring the excavated area around poles it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Rocks bigger than 50mm diameter, vegetation or creosote-impregnated soil are to be removed from the backfill material, and together with any wood shavings resulting from inspection and/or treatment procedures, shall be removed from site and disposed of lawfully. All spoil that needs to be removed from the site shall be managed as per NUS174C Environmental Procedures – Environmental Handbook for construction and maintenance.

Under NO CIRCUMSTANCES is vegetation to be placed in the excavation and covered with soil.

3.4.5.1 Unpaved Areas

In unpaved areas the inspection area around the pole is to be restored with the backfill material. Backfill the excavation in layers of 100mm, ramming each layer so as to firmly compact the soil until fully reinstated. The material is to be firmly tamped with a suitable tool so that it finishes slightly below ground line. The top surface is to be then finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline. Where turf has been removed to allow excavation, undamaged turf shall be neatly reinstated on top of the compacted soil.

The work area is to be cleaned with a broom and all surplus material removed from site.

Sandy loam shall be used in all residential areas.

On private properties in rural areas, local soil found on site may optionally be used for surface reinstatement around the pole rather than importing clean sandy loam to site. The local soil may be used where:

- property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

Note: The surrounding area must be left in an ‘as found’ condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and pot holes be created that may present a hazard.

3.4.5.2 Paved Areas

The inspection area around the pole is to be reinstated with 50mm thick cold bituminous pre-mix material (see Figure 3.4.2 below) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

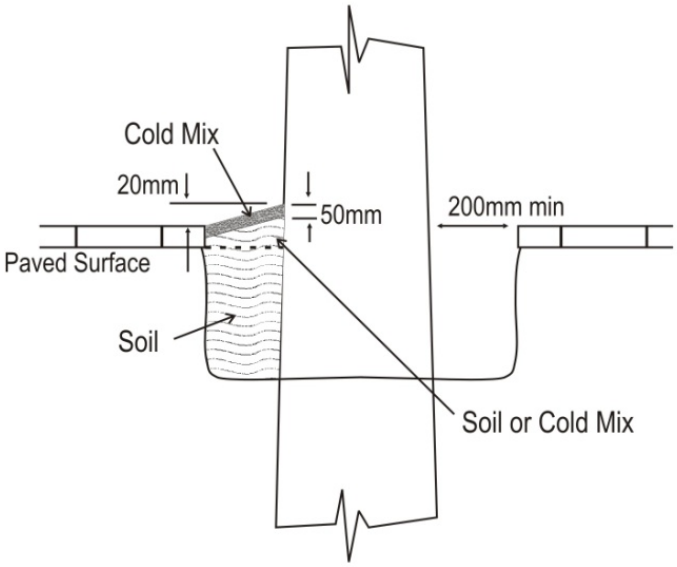


Figure 3.4.2: Cold Mix Installation

The backfill material is to be firmly tamped with a suitable tool so that it finishes approximately 50mm below the level of the pavement and all excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving. The bituminous pre-mix material is to be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence. The work area is to be cleaned with a broom and all surplus material is to be removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being carried out.

3.4.6 Marking Defective/Condemned Poles

Defective / condemned poles will be marked by the attachment of a single orange coloured 70mm wide band. This orange band is a safety warning device and it is essential that it be correctly installed so that it cannot be interfered with or become dislodged.

Defective / condemned poles are to be identified as follows (Refer Figure 3.4.3):

- Defective Poles – A single 70mm wide orange band secured around the pole at least 2.4m above ground but below 3m, encircling the whole pole, marked with Black “X X X”s and Ausgrid’s name and logo.
- Condemned Poles – A single orange band as for defective poles, plus a permanently marked “X” painted 1.8 m above ground on opposite sides of the pole (eg on the roadside and footpath faces) with the slashes of the “X” at least 500mm long, using the approved white paint (Stockcode 176429).

Note: Defective poles suitable for reinforcement can be marked with the orange band that may then be removed after reinforcement has taken place.

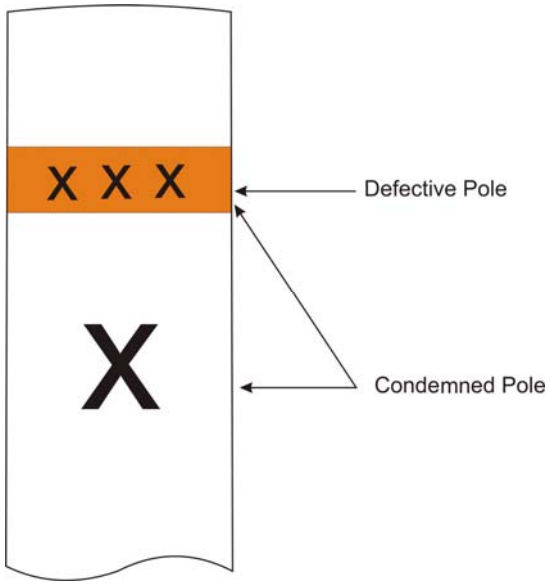


Figure 3.4.3: Defective/Condemned Pole Markings

3.4.6.1 Types of Marking Bands

There are two types of marking bands (both orange coloured and 70mm wide):

- a 1220mm long PVC plastic strip (Stockcode 180191), suitable for wood poles (shown here), and
- a roll of self adhesive tape (Stockcode 179704) may be applied to any pole but is most suitable for concrete, fibre composite and steel poles (not shown here).

3.4.6.2 PVC Plastic Strip

The PVC plastic strip, shown in Figure 3.4.4, is designed for use on timber poles, and is simply nailed to a timber pole using 40mm twist nails (Stockcode 175912).

Figure 3.4.4: PVC Plastic Strip

To install the PVC plastic strip:

Note: This is a safety device and correct installation is critical.

1. Place the orange strip around the pole at the designated height, with the company logo correctly orientated, and fix in position using 40mm twist nails.

2. For large diameter poles it will be necessary to fit an additional length of plastic strip to ensure that an orange identification band fully encircles the pole.

3.4.6.3 Stockcodes

Item	Stockcode
1220mm long, 70mm orange PVC plastic strip	180191
White paint (approved)	176429
40mm twist nails	175912

3.5 Termite Eradication Treatment

All poles found to be infested with termites shall be treated by means approved by Ausgrid, within 30 days of the termite treatment order being generated.

3.5.1 Mandatory Training

The application of Pesticides around poles shall only be carried out by licensed pest control personnel, or those qualifying for exemption as outlined below.

3.5.2 Work Health and Safety Regulation 2011 Exemption Order No.004/12.

Exemption

Pesticide users within the company jurisdictions of Ausgrid specified in Schedule 1 are exempt from clause 65 of Schedule 18B of the Work Health and Safety Regulation 2011, subject to the conditions specified in Schedule 2.

Schedule 1

Users, the pole asset inspection staff of Ausgrid and the contractors, who use the pesticides to control termites and treat timber as per Ausgrid instructions.

Schedule 2

1. The person with control of workplace or person with control of work, who authorises the use of pesticide to control termites and treat timber within the energy industry must:
   (a) ensure that the pesticides are only used by authorised persons;
   (b) meet all the relevant current requirements of the Pesticides Regulation 1995 including pesticide use notification and record keeping requirements;
   (c) have attained the relevant chemical user's qualification issued in accordance with Level 4 of the Australian Qualifications Framework (AQF) such as ChemCert or SMARTtrain that includes units AHCCHM401A - Minimise risks in the use of chemicals and AHCCHM402A - Plan and implement a chemical use program;
   (d) attain the Pole Inspectors Training (TAFE Course No.27510) within two year period from the date of issue of this exemption order (27 April 2012);
   (e) instruct those persons in the safe use of the pesticides and ensure that any hazards identified with such use have been assessed and adequately controlled and those persons are advised of the controls;
   (f) be satisfied those persons can be relied upon to use the pesticides without placing the health and safety of themselves or others at risk; and
   (g) ensure those persons are made aware of the application and limitations of this exemption order.
2. The person so authorised to use the pesticides to control termites and treat timber, in accordance with this exemption must:
   (a) be not less than eighteen (18) years of age;
   (b) meet all the relevant current requirements of the Pesticides Regulation 2009 including pesticide use notification and record keeping requirements;
   (c) have attained the relevant chemical user's qualification issued in accordance with Level 3 of the Australian Qualifications Framework (AQF) such as ChemCert or SMARTtrain that includes units AHCCHM303A – Prepare and apply chemicals and AHCCHM304A – Transport, handle and store chemicals;

Note: Under the Pesticides Amendment Regulation 2009 - this qualification lasts for 5 years after which the course must be undertaken again.

(d) attain the Pole Inspectors Training (TAFE Course No.27510) within one year period from the date of issue of this exemption order. This training currently does not require repeating in the future;

(e) be able to communicate to a level that enables them to perform their duties safely; and

(f) observe safe work practices at all times whilst using the pesticides and take action to prevent any person being placed at risk.

All trained personnel shall carry evidence of the prescribed qualification or training.

3.5.3 Termite Eradication Processes

Within the Ausgrid area Coptotermes (in particular Coptotermes Acinaciformis), Nasutitermes (in particular Nasutiterme Walkeri) and Glyptotermes are the particular species of interest and most likely to be identified. Refer to your training notes for detailed descriptions of these and other termite species.

When active termites are first identified, a termite tag shall be fixed to the pole in accordance with Section 3.5.7. Ausgrid has in place three different termite eradication procedures which form part of an integrated termite management process. The process or combination of processes, to be used will depend on the termite species and environmental circumstance. See flowcharts 3.5.1, 3.5.2 and 3.5.3. Where active Coptotermes Sp Termites are positively identified at the time of inspection, the Pole Inspector may install a bait at that time, or complete a termite notification and have a specialist pesticide officer complete the work. Where any other species of termite other than coptotermes are found, the pole inspector is to complete a termite notification and have a specialist pesticide officer complete the termite treatment work. The specialist pesticide officers will be pole inspectors who have received additional training and are individually authorised by Ausgrid.

Termiticide applications must be carried out according to label and manufacturer's instructions, and chemicals must be handled in accordance with the relevant material safety data sheet. Liquid Termiticide MUST NOT be applied to poles where there is free ingress of water into the excavated below ground inspection area. These poles must be treated using an alternate treatment.

Notes:

1. NO TREATMENT is to be applied in areas where the pesticide could enter water catchments, in or near water bodies, or such that they are likely to enter a waterway or drain. All pesticide applications must be in accordance with the relevant Acts and Regulations.

2. If active termites are found in the pole at the 12-month follow up inspection, or at any later time, a new 3 segment termite treatment tag will be fitted immediately below the previous tag (preferred location) and the process repeated. It is possible a pole may have multiple termite treatment tags, similar to the tag shown in Section 3.5.7. Figure 4, fitted over the course of its life.

3. When using dual treatments ie Dust / liquid, or Bait / liquid, the bait or dust is applied first and the liquid is applied no earlier than 12 weeks later. Under no circumstances are the 2 treatments to be applied at the same time.

4. Glyptotermes Sp termite infestations - have no treatment. Once their presence is confirmed, the pole is replaced. Evidence of their presence is their characteristic flight holes in the ground line region of the pole. Removal of small amounts of timber around these flight holes near ground line will reveal a 90° turn several millimetres from the surface. Internal inspection below groundline will reveal a 'good wood / bad wood' pattern indicating extensive damage near ground line. It is critical that a thorough internal inspection be carried out below ground line to confirm the pole has

sufficient sound wood to remain until replacement can be arranged. Distribution Engineering Mains Services should be consulted for assistance where doubt exists, and until such time as you are confident in what to look for. Glyptotermes Sp termites account for less than 1% of termite infestations, but for about 10% of pole failures.

5. CCA Treated Poles – baiting is not effective on CCA poles because the treated timber surface is repellent to them. Subterranean termites generally only infest CCA poles above ground line with no external evidence of their presence and are usually not identified until significant damage has occurred. The first indication of termites in CCA poles is usually a hollow sound above groundline – at which point the pole generally requires replacement. Where termites are identified earlier, a dust / liquid procedure should be used, or liquid only if the nest can be located.

3.5.4 Procedure 1: Bait and Liquid Termiticide

TERMITE TREATMENT FLOWCHART (Baiting & liquid termiticide) (Fig 3.5.1)

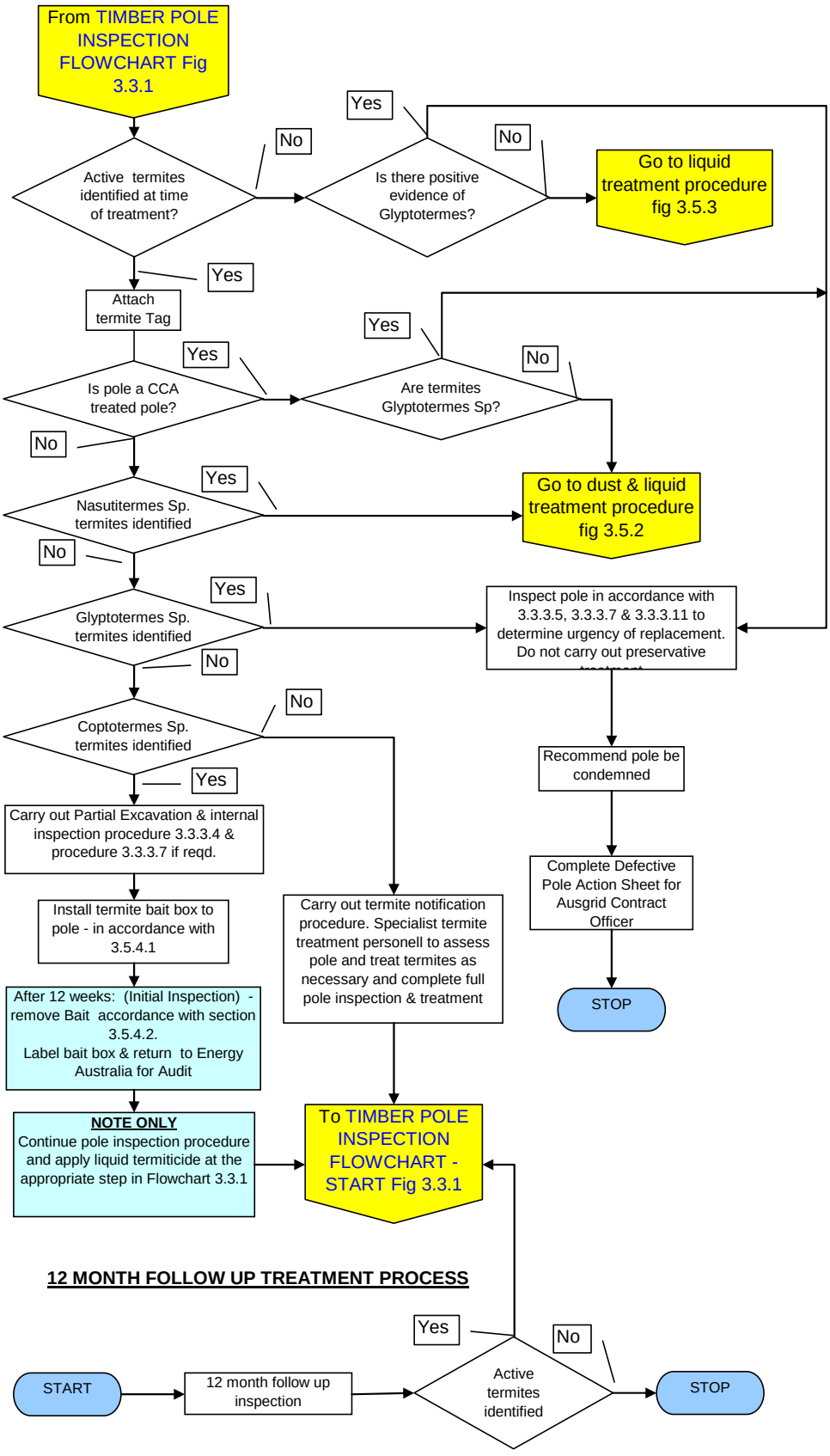


Figure 3.5.1: Termite Treatment Flowchart (Baiting & Liquid Termiticide)

This is a 2 stage process consisting of installation of a bait, followed no earlier than 12 weeks later by removal of the bait, completion of the pole inspection procedure, and application of a liquid termiticide to provide residual termite protection. The success of baiting depends heavily on achieving minimal disturbance to the termites and their workings so the level of termite activity is maintained. Therefore to ensure maximum effectiveness, the bait shall be installed by the Pole Inspector at the time of initial inspection when the termites are first identified.

Note: Baits should NOT be applied to CCA poles unless the installation procedure can reliably bring the termites from inside the pole, through the treated timber, into the bait. Termites will generally not remain in contact with the treated timber (see note 5 in section 3.5.3.).

Termites will abandon the area where the bait is installed without consuming the bait if they perceive a threat to their activity, or if sufficient disturbance allows entry of any black ants that may be on the pole. It has been observed that if black ants discover the termites when the termite galleries are broken for inspection, the likelihood of the termites consuming the bait is greatly reduced.

Therefore, the pole inspection procedure must stop when active termites are discovered. If the active termites are not Coptotermes Species termites, the inspection procedure may continue because disturbance does not significantly affect the treatment process used on other species. Baiting is only effective against Coptotermes species termites. Not withstanding, every effort should be made not to damage the external termite galleries where Nasutitermes are infesting the pole. If Coptotermes species termites are found then no further pole inspection work is to be carried out except that outlined in Section 3.3.1.1. If full excavation around the pole has been completed before the termites are discovered, then the full pole inspection procedure should be completed because significant disturbance has already occurred. In this instance, a bait shall still be installed because active termites have been identified and a bait can be placed in direct contact with them.

NO BAIT TERMITICIDE is to be applied unless active Coptotermes Sp termites are positively identified.

When a bait installation cannot be carried out at the time of initial inspection, for whatever reason, and it is to be installed subsequent to the initial termite identification, and no active termites can then be found at that later date, then a bait shall NOT be installed. The pole shall be fully inspected and treated with Termidor only when termites have previously been positively identified but no active termites are be found at the time of treatment.

Termite baits are only effective if placed in direct contact with active termites.

It has been observed that when termites totally consume the bait material the colony will ultimately die, however because the termiticide acts as an insect growth regulator, this may take several months depending on the time of year and the health of the colony. Also, termites will divert their activity from consuming the cellulose material of a timber pole to consuming the bait material once installed. This means that the destructive effect of the termites will be concentrated on and around the bait box, and destruction of the pole will decrease from that point, ultimately ceasing as the workers die. Towards the end of the process only soldiers will be observed as the worker caste termites will die first. These soldier caste termites will ultimately starve because there will be no workers to feed them.

Note: Baits installed in summer will, in general, be consumed quicker than those installed in winter, when termite activity is slower and the termites remain closer to the nest. Therefore, baits installed in winter will generally take longer to be consumed than those installed in warmer months and may therefore need to remain on the pole longer to complete their job.

3.5.4.1 Bait Installation

The bait containers currently being used contain 200 gms of a termiticide called 'Nemesis' – contained in two plastic bags housed inside a plastic container. The bait containers are made from grey plastic and are approximately 300mm long and 80mm wide and are sealed both ends with end caps. The bottom face of the bait container that attaches to the pole is slotted to allow termites to enter. Nemesis consists of 1.0 gm/kg of Chlorfluazuron – an insect growth inhibitor, in an alpha-cellulose base.

IMPORTANT
The bait has no mammalian toxicity (ie not toxic to humans). However, Chlorfluazuron is toxic to aquatic life (eg, all fish species) and must not be allowed to contaminate streams, rivers or waterways.

Installation Process

Nemesis baits must be installed in strict compliance with the label. Where these instructions are inconsistent with the label, the label has legal standing and must be followed.

1. Use a knife to cut both bait bags inside the box thereby exposing the bait material contained within.
2. Spray the bottom of the bait container with one light spray of pure water (NOT tap water as it contains chemicals such as chlorine and fluoride).
3. Fix the bait container to the pole such that the exposed bait material is in direct contact with the termites, or over the location where they were identified.
4. Attach the bait box to the pole with 2 - 100mm x 14g Bulge head class 2 wood screws, or equivalent, (Stockcode 179541) driven through the plastic bait box and into the pole.

The bait container must be fully sealed around its circumference where it attaches to the pole with Selleys 'No more gaps' sealant (Stockcode 179731). No other type of sealant is to be used. Use of sealant is critical in the success of the baiting procedure and MUST fully seal the bait to the pole. The purpose of the sealant is to retain moisture and provide mechanical protection to the area where the termites will leave the pole to enter the bait container. It is crucial that this area be sealed from predators such as ants and that moisture be retained so a favourable environment can be created for termite activity.

The name of the pole inspector who installs the bait, and date of installation, must be written clearly onto the bait container using a permanent waterproof marking pen, for later audit purposes. This may be written on the face of the bait that contacts the pole, or on the bottom cap, so as not to be visible to the public – but must be permanent and easily read.

3.5.4.2 1st Inspection

Baits shall be removed no sooner than 12 weeks after installation, a full pole inspection carried out and the pole treated with Termidor liquid in accordance with Section 3.5.6.

1. Remove the fixing screws and detach the bait container from the pole.

   Note: Active termites may still be present in and behind the bait box, however if all the bait material has been consumed the colony will die.

2. Write the pole number and bait removal date onto the bait container using a permanent waterproof marking pen and return the bait container to Ausgrid's Distribution Engineering Mains Services Section for audit.
3. Record your findings then carry out a full pole inspection if not previously completed and treat with Termidor liquid as per Section 3.5.6.

3.5.4.3 12 Month Follow-up Termite Inspection

This inspection shall be carried out by an authorised pesticide officer only. The post-treatment final inspection is to confirm that termites have been completely eradicated and have not re-infested the pole. It shall consist of an external and internal visual inspection of the pole, looking for active termites. It is generally not necessary to dig out and drill the pole below G/L. This is not a pole inspection, but a termite inspection. It is not necessary to carry out a full pole inspection as per Section 3.3 unless active termites are found and it is suspected that further damage may have occurred.

The 12 month follow-up termite inspection is to be performed within the November-February period. However, if the termite treatment occurred within the three months prior to November (i.e. during August, September, October), then the follow-up Pole Inspection is to be completed within the next November-February period.

The search for active termites shall consist of the following procedures:

1. Gently break open any mudded termite galleries looking for active termites. An old hacksaw blade or a drill can be helpful in investigating mudded checks in poles that extend deep into the wood. A mirror to direct sunlight, or a torch, is helpful in checking for active termites.
2. Cut away any loose sapwood where external termite damage exists. Termites may be found under intact sapwood.
3. Remove all external above ground plastic plugs and check for mudding and termites inside the hole. Use a Borescope to check for active termites inside the pole where evidence of termites exists (a Borescope is an essential tool when carrying out this work). It is often necessary to drill additional holes above ground line when searching for termites. Following treatment, termites will commonly abandon previous areas of infestation and move elsewhere and may only be found by drilling additional inspection holes. It is less damaging to the pole, and therefore preferable to drill in the neutral axis or into an existing check in the pole above groundline when searching for termites. Termite inspection holes should be no larger than 12mm diameter, and treated with Preschem rods and sealed with black plugs when finished.

3.5.5 Procedure 2: Dust and Liquid Termiticide

TERMITE TREATMENT FLOWCHART (Dust & liquid termiticide - Specialist Pesticide Officer) (Fig 3.5.2)

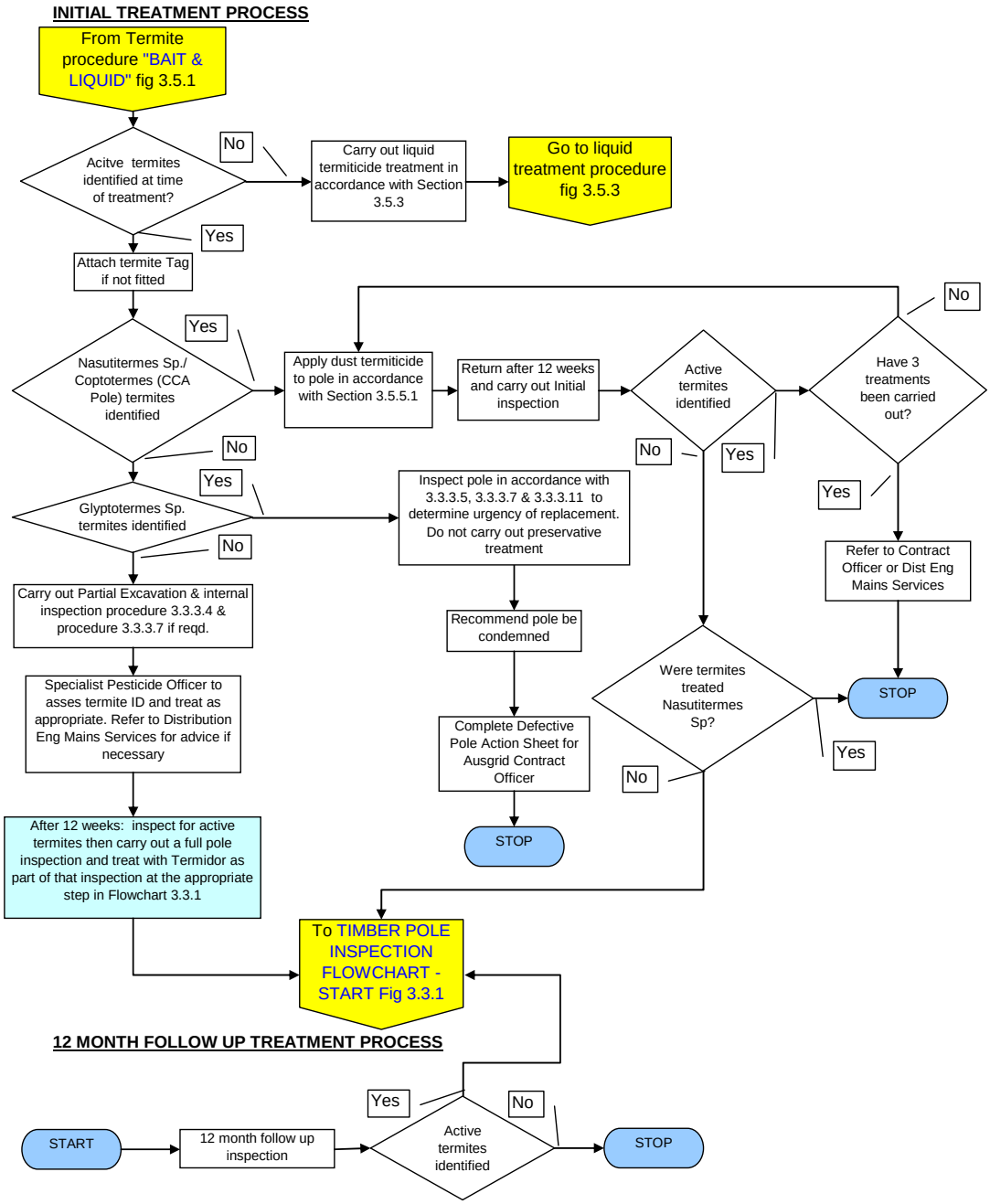


Figure 3.5.2: Termite Treatment Flowchart (Dust & Liquid Termiticide - Specialist Pesticide Officer)

In the case of some termite species the success of Termite dusting depends heavily on achieving minimal disturbance to the termites and their workings so that the level of termite activity continues. The pole inspection procedure must stop when active termites are discovered. In the case of Nasutitermes or Glyptotermes Species, the inspection procedure may continue because disturbance is not as important, however every effort should be made not to damage the external termite galleries where Nasutitermes are infesting the pole. Where Coptotermes species termites are found no further pole inspection work is to be carried out except that outlined in Section 3.3.1.1. If full excavation around the pole has been completed before the termites are discovered, then the full pole inspection procedure should be completed because significant disturbance has already occurred.

3.5.5.1 Treatment Procedure

The dust termiticide currently used by Ausgrid is Termidor – active ingredient Fipronil.

Termidor dust must be applied strictly in accordance with the produce label.

Before treatment, ensure a Termite Treatment tag is attached to the pole. If a Termite Treatment tag is not attached, attach a tag in accordance with Section 3.5.7. This is essential to warn others that a termite eradication process is in place and that termites may still be present.

When carrying out termiticidal dusting it is important that only a light dusting is applied, and that the dust contacts as many worker termites as possible. Not all poles are suitable for a dusting treatment. Apply dust strictly in accordance with the product label. Dust should be reapplied if active termites are evident 4 weeks after 1st application – as per label.

3.5.5.2 1st Inspection

Return to the pole 12 weeks after treatment and inspect for active termites.

Record your findings then carry out a full pole inspection if not previously done and treat with Termidor liquid as per Section 3.5.6.

3.5.5.3 12 Month Follow-up Termite Inspection

In accordance with Section 3.5.4.3.

3.5.6 Procedure 3: Liquid Termiticide Only

TERMITE TREATMENT FLOWCHART (Liquid Termiticide - Specialist Pesticide Officer) (Fig 3.5.3)

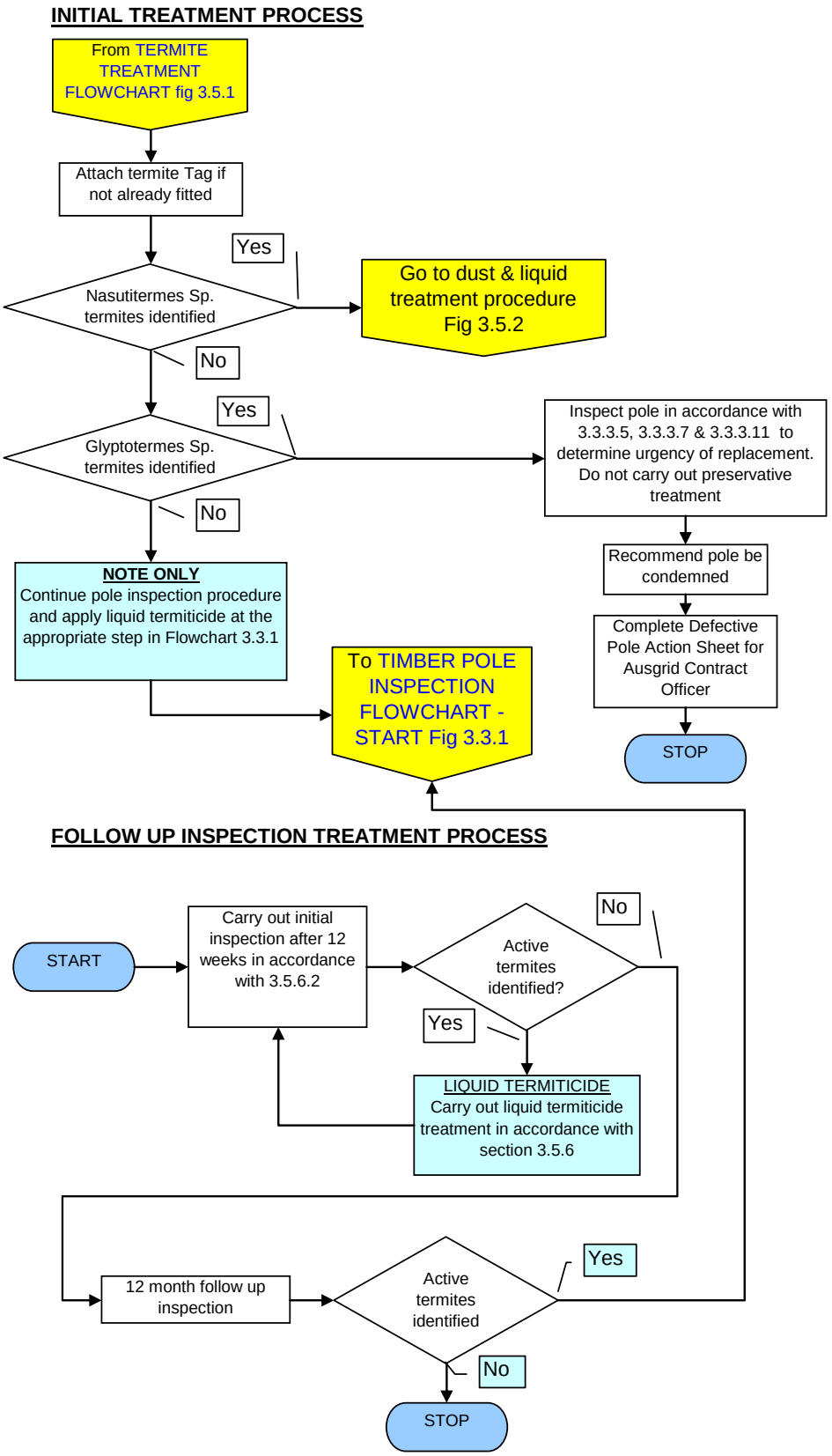


Figure 3.5.3: Termite Treatment Flowchart (Liquid Termiticide - Specialist Pesticide Officer)

Termidor liquid termiticide is used by Ausgrid as part of an integrated termite management system. It is used to provide residual termite protection following previous treatments designed to eliminate the nest. It is only used as a single treatment where the nest can be located and flooded with termiticide, or as residual treatment where termites have been identified and treated or are no longer infesting the pole.

The full pole inspection procedure may be completed prior to liquid termiticide treatment being carried out. This treatment may be carried out in conjunction with the inspection of the pole, or at a subsequent date.

3.5.6.1 Treatment Procedure

The liquid termiticide currently used by Ausgrid is Fipronil, marketed under the name 'Termidor'. It is mixed at a ratio of 600 ml in 100 litres of water, and applied at the rate of 100 litres per cubic metre of soil. Where soil is very dry, it may be necessary to wet it with water prior to termiticide application.

As a guide, between 7 and 20 litres of liquid termiticide will be required to treat the soil around the pole, depending on pole size and width of the excavation. The soil around the pole should be treated to a depth of 450mm forming a soil barrier at least 150mm wide. If a nest is identified inside a pole, it may be flooded with termiticide in accordance with the product label instructions.

Before treatment, ensure a Termite Treatment tag is attached to the pole. If a termite tag is not attached, attach a tag in accordance with Section 3.5.7. This is essential to warn others that a termite eradication process is in place and that termites may still be present.

The liquid termiticide is to be applied by full excavation of the pole to 350mm deep, injection into the bottom of the excavation to form a barrier below the excavated area, then puddling the termiticide around the pole as the soil is replaced in accordance with the label. The soil must be replaced in approximately 4 equal quantities, not all at once, puddling termiticide into the mix and compacting the soil between each stage. The object is to ensure an even distribution of termiticide through the backfilled material.

3.5.6.2 1st Inspection

Return to the pole twelve weeks after treatment to confirm initial control of termites. Inspect for termite activity in accordance with Section 3.3.1. If termites are still present, the pole will need to be re-treated in accordance with Section 3.5.

3.5.6.3 12 Month Follow-up Termite Inspection

In accordance with Section 3.5.4.3.

3.5.7 Identification of Termite Affected Poles

Ausgrid poles affected by termites are identified with a 3 segment tag that provides information on the current treatment process and permanently identifies the pole as having been affected by termites.

Figure 1

Figure 2

Figure 3

Figure 4

These tags replaced the circular "T" disk previously used to identify termite-affected poles. The tags are powder coated aluminium, engraved to show the nail fixing location and the 'T', 'T'1 and 'T2' markings, together with the segment snap points.

All new termite affected poles shall be identified using the 3 segment tag in accordance with this Section.

3.5.7.1 Initial Installation

Figure 1 above shows a tag as would be fitted to a pole when termites are first detected. The tags will be nailed to the pole (with a 40mm twist nail stockcode 175912) with the nail being driven through the top tag at the engraved location point.

The termite treatment tags are to be located as follows:

- Below any tape markings and at least 2.2 metres above ground line.
- On the approach side face of the pole, this will normally be the roadside face.
- Where there is no clear approach side or adjacent road, the tag shall be located in the same axis as the pole ID disc.

3.5.7.2 At the Time of Initial Termite Treatment

The top segment of the tag (T) shall have the date of the initial treatment 'number stamped' onto the aluminium tag as shown in Figure 2. If alternative methods of recording the treatment date are used they must be equally permanent and legible. Where a tag is installed prior to treatment, it should be nailed to the pole so that it can be readily removed from the pole at the time of initial treatment to facilitate recording the treatment date onto the tag. This is more easily done on a hard flat surface. However when finally fixed to the pole, the termite tag shall be nailed using a 40mm twist nail to reduce the chance of detaching from the pole.

Figure 2 shows a tag as would be fitted to a pole at the time of initial termite treatment where it is stamped with the month and year of that treatment (eg, "6 06", 6 – June, 06 – 2006).

3.5.7.3 Completion of First Successful Termite Inspection

The lowest section of the tag (T1) shall be removed at the successful completion of the initial inspection following treatment, when no further termite activity can be found.

Figure 3 shows a tag as would be fitted to a pole at the successful completion of the first inspection where no active termites were found. At this time the “T1” tag is broken off. This tag should not be broken off until all termite activity has ceased.

3.5.7.4 Completion of Final Termite Inspection

The centre section of the tag (T2) shall be removed at the 12-month follow up inspection. Figure 4 shows a tag as would be fitted to a pole following completion of the 12-month follow up inspection.

The purpose of this section of the tag is to provide permanent identification of a pole that has been affected by termites.

3.5.7.5 Stockcodes

Item	Stockcode
Termite Tag	91975
Termidor liquid	179962
Nemesis Termite baits for poles	179631
100mm x 14g Bulge head class 2 screws (may have to direct order-)	179541
40mm twist nails	175912
Selleys No More Gaps	179731
Termidor Dust	181753
Resealable Plastic bag 400mm x 355mm 'Zip Lock' for returning baits	38562

4 Inspection Process - Steel Poles and Standards

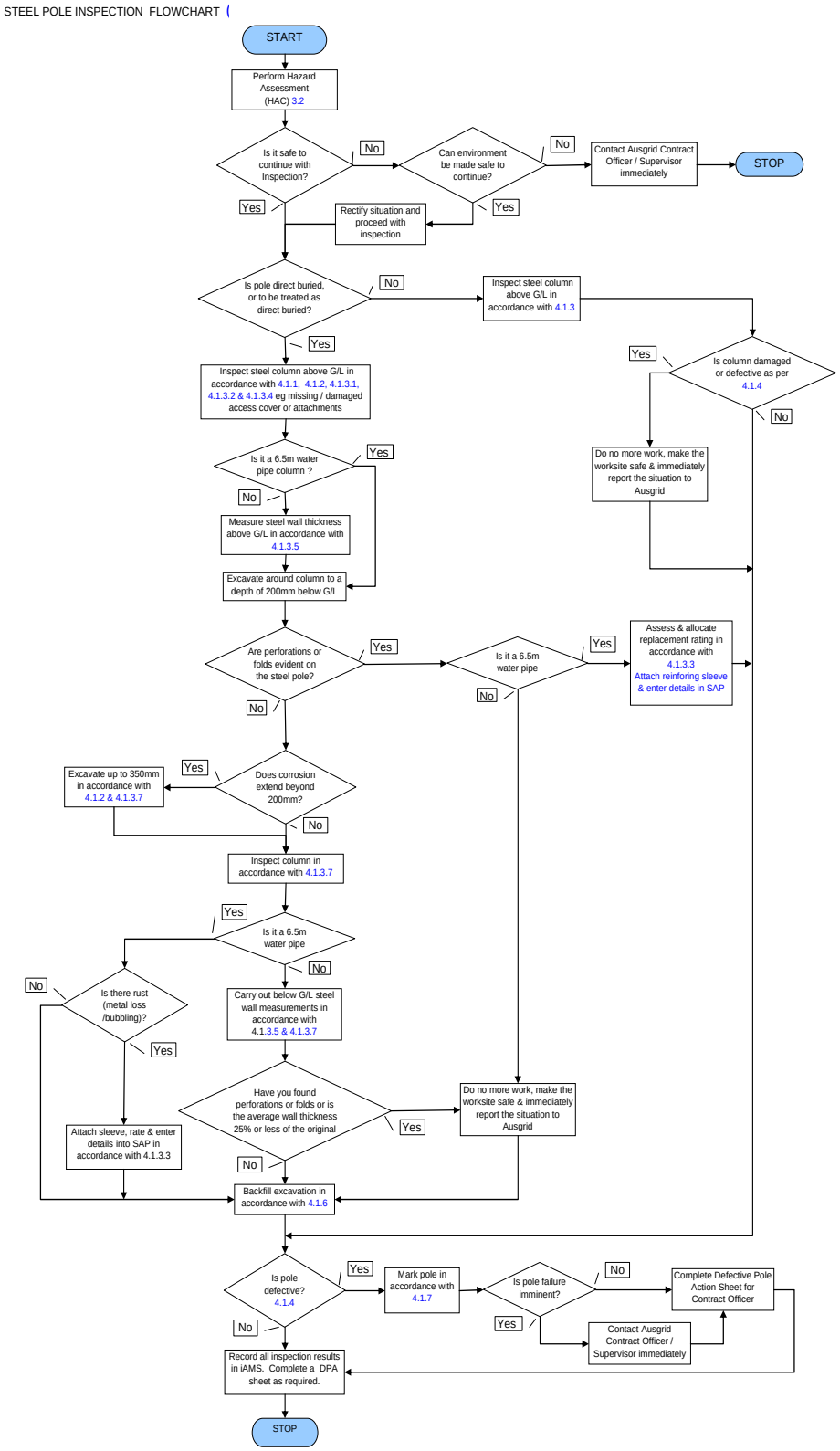


Figure 4.1.1: Steel Pole Inspection Flowchart

4.1 Steel Poles and Standards Inspection Process

4.1.1 Visual Inspection

Overall visual inspection of the pole and removal of any advertising or loose surface material from within the inspection area of the pole shall be carried out, looking for above ground damage or defects. The surface of the pole shall be visually inspected for evidence of defects including those listed in Section 4.1.3.1.

4.1.2 Partial Excavation - Steel Poles

CAUTION

Extreme caution is to be exercised when excavating around a pole, particularly those that have cables and other items attached to them. Where a cable enters the ground from a pole, it should NOT be assumed that the cable enters vertically, or that it is clear of the remaining inspection area around the pole.

Partial excavation should be carried out around poles on non-load bearing faces (Neutral axis) of the pole prior to full excavation. The purpose of partial excavation is to allow an examination of part of the below-ground section of the pole so it can be determined if it is safe to fully excavate. Partial excavation is only carried out in an unloaded or supported axis (Neutral axis).

Direct Buried steel poles and standards commonly corrode very close to ground line, however where substantial corrosion exists near ground line, it is not always visible above ground line.

If perforations or folds in the steel wall are found, no further excavation is to be carried out. The site must be secured and the situation reported. Full excavation can only proceed where adequate wall thickness is found following partial excavation.

4.1.3 Inspection and Treatment Procedure

4.1.3.1 Steel Pole Defects

Inspect and/or check for the following defects:

- Rust stains on the pole exterior, rust and perforations

Note: A Rust stain by itself with no loss of metal or bubbling is not a defect but could be an indication that a defect exists behind a thin exterior coating of material such as paint or galvanising. A rust stain could also be an indicator of a possible future rust defect. Any rust bubbling or staining needs to be carefully investigated visually and physically with a hammer to assess any metal loss or flaking.

- Rusting of fittings, etc
- Damage

Note: Missing or severely damaged access covers, or loose or damaged attachments to poles, such as earthing connections, are to be immediately reported to the Ausgrid Supervisor/Contract Officer/Customer Supply Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet.

- Pole lean
- Where the steel pole or standard is dented such that:-
  - the flattened section of the column is 50% or more of the diameter of the column at that level, or
  - a 1 metre steel straight edge placed along the back of the column where a dent is located shows a bend in the column; (see following figures)

immediately report the pole to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet.

- Inadequate Pole Strength – see 4.1.3.5 Formula Calculations – Steel Poles and 4.1.3.7 Below Ground Inspection Procedure - Steel Poles – Direct Buried.
- Folds or Perforations in the Column.

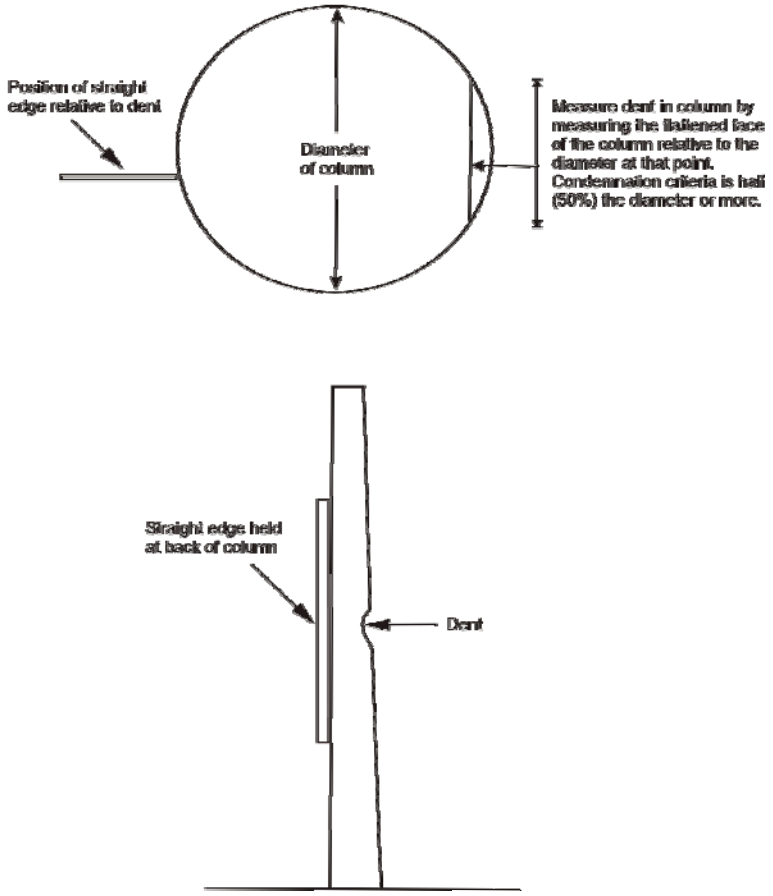


Figure 4.1.2: Steel Pole Dent Measurements

Where visible above ground corrosion is present it must be completely removed and a wall thickness measurement taken. To determine the strength of the pole at that level, 3 additional readings must be taken in the same horizontal plane as the first measurement. These 4 readings should be evenly spaced (approximately 90° apart). All 4 measurements shall be recorded in SAP together with their distance from groundline and respective quadrant indicated.

Perform a strength calculation as per Section 4.1.3.5.

Note: A smooth level surface is required to obtain an accurate reading with an ultrasonic meter – recommended Ultrasonic meter is a “TIME Ultrasonic Thickness Gauge TT100” fitted with a 6 mm dia sensor. Refer manufacturer’s data sheet, and training notes where available, for more information. An angle grinder with sanding (flap) disc or metal grinding disc will typically be required to clean a rusted surface to a suitable state. Only the minimum amount of material should be removed in order to achieve a contact patch for the meter. Use of any grinding attachment shall be confined to spot cleaning the localised areas for measurement as described above. General grinding of the pole face is not acceptable under any circumstance. The Galvanised protective coating must NOT be ground off under any circumstances.

4.1.3.2 Steel Poles – Direct Buried

All direct buried Steel Poles and Standards over 15 years old are to be inspected both above and below ground line for damage and corrosion.

For poles 15 years and under complying with the Ausgrid steel pole specification it is not necessary to inspect below ground line, however they are to be inspected above ground line for damage and corrosion.

Note: Some decorative steel columns and 6.5 m direct buried 'water pipe' type columns do not comply with the Ausgrid specification and must be inspected every 5 years regardless of age.

The inspection shall include a strength assessment by direct wall thickness measurement using an Ultra Sonic meter. The area with the worst damage in the above ground region, and again in the below ground region, is to be assessed by comparing its remaining wall thickness value with an original condition above ground sample reading. Any variation in wall thickness is expressed as a percentage and related directly as a remaining strength value.

4.1.3.3 6.5 m Direct Buried Water Pipe Type Columns

These columns have comparatively poor durability and are not to be strength assessed with an Ultra Sonic meter or have any remedial rust treatment carried out.

Where corrosion or loss of section is found at or below ground line they are to have a reinforcing sleeve attached and given a replacement rating (refer table below). Poles that are to be replaced within a 12 months period are to be marked in accordance with Section 4.1.7 Marking Defective/Condemned Poles.

Poles inspected after March 2014 must be rated in accordance to the table below. The application of the reinforcement sleeve and the replacement of the water pipe streetlight pole are nominated in the table. The date of the sleeve application, the rating and nominated pole replacement period needs to be entered into SAP.

Replacement Rating Table

Rating	Description	Reinforcing Sleeve	Next Inspection (5 year period)	Replacement Period
1	Rust stain / discolouring and galvanised coating is intact	No	Inspect as per NS145 and assess	No rust at 5 year inspection - Replace before the next 5 year routine inspection. Rust at 5 year inspection - Attach a sleeve to the pole and replace within 12 months.
2	Rust – loss of metal/bubbling	Yes	Inspect the pole above the sleeve and the sleeve for rust.	No rust to the pole or sleeve - Replace before the next 5 year routine inspection. Rust to the pole or sleeve - Replace within 12 month period
3	Rust – perforation in steel wall of pole	Yes		12 months
2 or 3	Can't apply a sleeve for any reason eg concrete foundation	No		12 months, or Ausgrid's Contract Operation Officer may nominate a shorter pole replacement period.
2 or 3	Pole sleeve already applied from previous inspections and before rating system introduced.	Existing	Inspect the pole above the sleeve and the sleeve for rust.	No rust to the pole or sleeve - Replace before the next 5 year routine inspection. Rust to the pole or sleeve - Replace within 12 month period Ausgrid's Contract Operation Officer may nominate a pole replacement period within a 12 month window.

Notes: 1. Any perforation or folding of the pole above the sleeve or loss of metal to the reinforcement sleeve is a critical condition and may necessitate emergency replacement; and

2. Inspection of the pole below the sleeve should not be attempted as the additional excavation would increase the risk of the pole falling.

4.1.3.4 Above Ground Inspection Procedure

The nominal (original) wall thickness of the steel pole/standard shall be measured 300mm above ground line. This measurement is to be used as the reference for the below ground inspection in Section 4.1.3.7.

Note: Where previous nominal wall thickness values are available from earlier inspections, it is not necessary to carry out another reading at this inspection.

When measuring the nominal wall thickness, the area on or immediately around the access cover must not be used because the steel wall in this area is reinforced and may be thicker than normal. A minimum of 4 measurements shall be taken, evenly spaced around the steel column at 300mm above ground line to establish the nominal wall thickness. The 4 measurements shall be added together and divided by 4 to give the nominal wall thickness. Any single individual measurement of wall thickness above 5.5mm shall be ignored and a figure of 5.5mm used. If all measurements taken are greater than 5.5mm, the average of these readings shall be recorded as the nominal wall thickness.

4.1.3.5 Formula Calculations – Steel Poles

The residual above ground wall thickness shall be measured using the following formulae:

$$\frac{T1a + T2a + T3a + T4a}{4} \Big/ \frac{T1n + T2n + T3n + T4n}{4}$$

Where:

T1n – is the first wall thickness reading taken 300mm above G/L for determining nominal wall thickness.

T2n, T3n & T4n – are the remaining 3 wall thickness readings taken 300mm above G/L for determining nominal wall thickness.

T1a – is the 1st wall thickness reading taken at the location of the worst defect found above ground line.

T2a, T3a & T4a– are the remaining 3 wall thickness readings taken in the same horizontal plane as T1 but spaced around the pole approximately 90° apart.

If no metal loss and/or corrosion is evident the above ground residual wall thickness is 100%. If corrosion is evident above the point of reach, indicate this in SAP and the DPA - Steel. Where above ground corrosion is detected, treat in accordance with Section 4.1.3.6.

The residual below ground wall thickness shall be measured using the following formulae

$$\frac{T1b + T2b + T3b + T4b}{4} \Big/ \frac{T1n + T2n + T3n + T4n}{4}$$

Where:

T1n – is the first wall thickness reading taken 300mm above G/L for determining nominal wall thickness.

T2n, T3n & T4n – are the remaining 3 wall thickness readings taken 300mm above G/L for determining nominal wall thickness.

T1b – is the 1st wall thickness reading taken at the location of the worst defect found below ground line.

T2b, T3b & T4b– are the remaining 3 wall thickness readings taken in the same horizontal plane as T1b, but at 3 other points where it appears there is a significant defect, or 90° apart if no other obvious significant defects.

4.1.3.6 Treatment of Steel Poles/Standards – Above Ground Line

Where rust scaling is found it must be removed and the extent of the external metal loss measured.

Any corrosion evident 150mm or more above groundline shall be completely removed. The surface shall be treated with cold galvanising spray stockcode 176055. Treatment shall be applied and cured strictly in accordance with the manufacturer's instructions. A clean dry prepared surface is essential for the treatment adhesion and performance. Apply one coat of cold galvanising in accordance with the manufacturer's instructions over the prepared surface area, having a minimum dry film thickness of 100 microns.

Note: A sound galvanised surface **must not** be coated with a galvanised paint as it will initiate pitting corrosion.

4.1.3.7 Below Ground Inspection Procedure - Steel Poles - Direct Buried

The below ground section, down to 200mm below ground line, of all direct buried steel poles & standards must be exposed for inspection. Corrosion of the steel wall may be internal or external and therefore a severely corroded wall may appear in good condition from the outside.

If perforations or folds are evident on a steel pole at any point during the inspection, the site shall be secured to ensure the safety of the public and property in the event of a pole failure, and the situation reported to the Supervisor or the Contract Officer immediately.

Note: All new steel columns are fitted with a protective epoxy coating in the below ground section of the pole. This is designed to lengthen the life of the pole and UNDER NO CIRCUMSTANCES is it to be removed or damaged.

Procedure:

(a) Excavate to a depth of 200mm below groundline. If corrosion is detected and it continues beyond 200mm, excavate further to ascertain the extent of the corrosion. Dig no deeper than 350mm. Excavation may include the removal of concrete.

(b) Examine the surface of the pole for rust from the base of the excavation to immediately above groundline, around the full circumference of the steel pole or standard.

(c) Sound the steel pole/standard as part of the below ground inspection by tapping it with the flat face of a hammer. The purpose of tapping the pole is to dislodge both internal and external rust and expose any perforations in the steel pole. The sound the hammer makes striking the pole is not important.

Note: Tap the pole gently, otherwise damage to the galvanised or painted surfaces will result if the pole is hit too firmly. To detect defects in steel poles/standards it is only necessary to tap the pole gently.

(d) Brush soil and debris from the surface of the steel pole/standard. If corrosion is evident during the inspection, clean the surface further to ensure it is free from loose contaminants and rust, with a chipping hammer, metal scraper and/or steel wire brush. Pay particular attention to areas of deep corrosion or bubbling under prior treatments. Do not remove surface material that shows no signs of corrosion, in particular DO NOT damage the epoxy coating. The epoxy coating is a protective layer designed to prolong the life of the galvanised coating, and while ever the epoxy coating is intact, the galvanised surface underneath will also be intact.

(e) Note the horizontal plane that displays the deepest corrosion. Take four measurements in this horizontal plane at four points evenly spaced around the pole using an ultrasonic meter, making sure that the deepest corrosion points are measured. Measurements of wall thickness shall only be made from the external surface of the steel pole/standard. All four measurements shall be recorded in SAP together with their distance from groundline, and their respective quadrant indicated. Perform a strength calculation in accordance with Section 4.1.3.5 Formula Calculations – Steel Poles. The ratio of the average of the four measurements to the nominal wall thickness (taken in Section 4.1.3.4 Above Ground Inspection Procedure), is the below ground residual strength of the steel pole/standard. If no metal loss and/or corrosion is evident the below ground residual strength is 100%.

Note: A smooth flat surface is required to obtain an accurate reading with an ultrasonic meter. An angle grinder with sanding (flap) disc or metal grinding disc will typically be required to clean a rusted surface to a suitable state. Only the minimum amount of material should be removed in order to achieve a contact patch for the meter. Use of any grinding attachment shall be confined to spot cleaning the localised areas for measurement as described above. General grinding of the pole face is not acceptable under any circumstance.

The Galvanised protective coating must NOT be ground off under any circumstances.

Note: Notify the Supervisor or Contract Officer immediately if:

- Perforations or folds are evident at any point during the inspection
- Corrosion has penetrated, such that the average residual wall thickness calculated from the four readings is 25% or less of the original wall thickness.
- Corrosion extends beyond 350mm below the ground line.

Upon completion of inspection and treatment, backfill the excavation in accordance with Section 4.1.6 Restoration of the Excavation.

4.1.3.8 Steel Poles – Ragbolt Mounted

Ragbolt mounted Steel Poles and Standards are to be inspected above ground line for damage and corrosion in accordance with 4.1.1 - Visual Inspection. However because they have no in-ground section it is not necessary to take wall thickness measurements using an Ultra Sonic meter. It is also not necessary to excavate and inspect below groundline as the heavy section steel ragbolt assembly and hot dipped galvanised coating is expected to outlast the above ground section of the pole. Inspect rag-bolt mounted steel columns and poles in accordance with 4.1.3.9 below

Some ragbolt mounted steel poles and standards have become effectively ‘direct buried’ due to the surrounding ground level being raised. Where the mounting bolts of a ragbolt mounted steel column are below groundline and cannot be seen, it is to be treated as ‘direct buried’ and maintained as per Direct Buried Steel Pole/ Standards above.

Any corrosion evident above groundline shall be completely removed. The surface shall be treated in accordance with 4.1.3.6 above.

4.1.3.9 Steel Pole Defects – Ragbolt Mounted

Inspect and / or check for the following defects:

- Nuts used to secure poles mounted on rag bolts are to be checked for tightness using a spanner. Loose nuts are to be tightened.
- Check hold-down bolts below securing nut on rag-bolts for signs of rust. Whenever grouting is replaced, visually check hold-down bolts below mounting plate for signs of rust.
- Check grouting below the base of rag-bolt mounted columns is intact and capable of sealing the column from the ingress of vegetation.
- Check base plate weld for rust or cracking.
- Extensive corrosion of the base, bolts or threaded foundation rods, or cracked welds around the baseplate, of ragbolt style steel poles shall be reported to the Supervisor or the Contract Officer immediately.

4.1.3.10 Regrouting Below Baseplate of Ragbolt Mounted Standards

Missing or defective grouting below the column base on rag-bolt mounted columns is to be replaced by the Pole Inspector as part of the inspection. Any remaining grout is to be removed, together with any vegetation, and the area between the base of the steel column and the top of the concrete holding the ragbolt assembly must be cleaned out and prepared prior to replacement of the sand/cement grouting.

The space beneath the ragbolt mounting baseplate of the standard is to be filled with cement grout in accordance with the following specification:

- With the four bolts or threaded foundation rods of the ragbolt assembly used as a frame, a 2mm thick strip of cardboard is to be wrapped twice around the four bolts and taped in place. The cardboard is to be placed between the underside of the standard mounting baseplate and the top of the specified fill for the ragbolt assembly.
- The space around the outside of the cardboard former is to be filled with a 4:1 sand and cement mix, or suitable commercial premixed grout as approved by Ausgrid. The sides of the cement mix fill are to be trowelled from the outside edge of the baseplate to the ground at an angle of 45 degrees. This plinth is to prevent the entry of grass, weeds and foreign objects into the standard.
- If vandalism or slumping of the cement mix is a problem, a 350mm square former (inside dimension) with vertical sides, may be used to form the outside of the plinth.

4.1.4 Defective Steel Poles and Standards

A steel pole or standard with the following defects is to be classified as defective and immediately reported to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet. Mark the pole in accordance with Section 4.1.7.

- Where steel poles or columns are found with perforations or folds due to rust at any location on the pole or column, the site must first be secured to ensure the safety of the public and property, then reported.
- Missing or severely damaged access covers, or loose or damaged attachments to poles, such as earthing connections, are to be immediately reported to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet. The pole is to be classified as defective and repaired where feasible, or condemned and replaced.
- Where the steel pole or standard is dented such that:

- the flattened section of the column is 50% or more of the diameter of the column at that level, or
- a 1 metre steel straight edge placed along the back of the column where a dent is located shows a bend in the column, as shown in 4.1.3.1 Steel Pole Defects.

- Where corrosion extends below 350mm below groundline.
- Where the pole's residual strength figure is found to be 50% of less.
- Where scaling rust is found and Ausgrid is currently specifying no remedial treatment below groundline.

4.1.5 Reinforced Steel Poles and Steel Standards

Ausgrid does not reinforce steel poles, except Hunter type 6.5 m water pipe columns which are reinforced with a bolt-on reinforcing sleeve until replacement can be arranged. Where these reinforced columns are found they are to be given a replacement rating as described in the table in Section 4.1.3.3 and replaced accordingly.

4.1.6 Restoration of the Excavation

When restoring the excavated area around poles following inspection and treatment, it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Rocks bigger than 50mm diameter and vegetation are to be removed from the backfill material, removed from site and disposed of lawfully. All spoil that needs to be removed from the site shall be managed as per NUS174C Environmental Procedures – Environmental Handbook for construction and maintenance.

Under NO CIRCUMSTANCES is vegetation to be placed in the excavation and covered with soil.

4.1.6.1 Unpaved Areas

In unpaved areas the inspection area around the pole is to be restored with the backfill material. Backfill the excavation in layers of 100mm, ramming each layer so as to firmly compact the soil until fully reinstated. Take care not to damage the external face of the pole or column. The material is to be firmly tamped with a suitable tool so that it finishes slightly below ground line. The top surface is to be then finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline. Where turf has been removed to allow excavation, undamaged turf shall be neatly reinstated on top of the compacted soil.

The work area is to be cleaned with a broom and all surplus material removed from site.

Sandy loam shall be used in all residential areas.

On private properties in rural areas, local soil found on site may optionally be used for surface reinstatement around the pole rather than importing clean sandy loam to site. The local soil may be used where:

- property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

Note: The surrounding area must be left in an 'as found' condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and pot holes be created that may present a hazard.

4.1.6.2 Paved Areas

The inspection area around the pole is to be reinstated with 50mm thick cold bituminous pre-mix material (see Figure 4.1.3 below) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

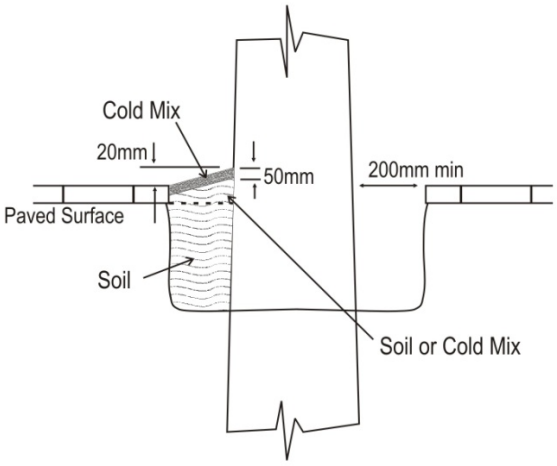


Figure 4.1.3: Cold Mix Installation

The backfill material is to be firmly tamped with a suitable tool so that it finishes approximately 50mm below the level of the pavement and all excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving. The bituminous pre-mix material is to be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence. The work area is to be cleaned with a broom and all surplus material is to be removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being carried out.

4.1.7 Marking Defective/Condemned Poles

Defective / condemned poles will be marked by the attachment of a single orange coloured 70mm wide band. This orange band is a safety warning device and it is essential that it be correctly installed so that it cannot be interfered with or become dislodged.

Defective / condemned poles are to be identified as follows (Refer Figure 4.1.4):

- Defective Poles – A single 70mm wide orange band secured around the pole at least 2.4m above ground but below 3m, encircling the whole pole, marked with Black “X X X”s and Ausgrid’s name and logo.
- Condemned Poles – A single orange band as for defective poles, plus a permanently marked “X” painted 1.8 m above ground on opposite sides of the pole (eg on the roadside and footpath faces) with the slashes of the “X” at least 500mm long, using the approved white paint (Stockcode 176429).

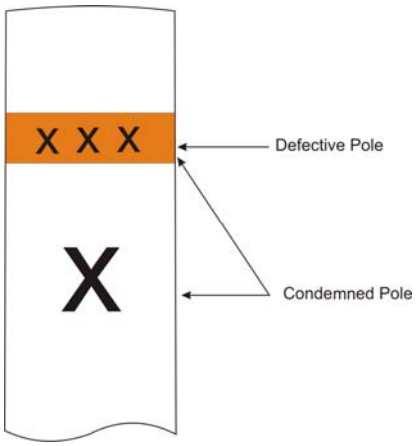


Figure 4.1.4: Defective/Condemned Pole Markings

4.1.7.1 Types of Marking Bands

There are two types of marking bands (both orange coloured and 70mm wide):

- a 1220mm long PVC plastic strip (Stockcode 180191), suitable for wood poles (not shown here), and
- a roll of self adhesive tape (Stockcode 179704) may be applied to any pole but is most suitable for concrete, fibre composite and steel poles (shown here).

4.1.7.2 Self Adhesive Tape

The self adhesive tape, shown in Figure 4.1.5, may be applied to any pole, but it is most suited to concrete and steel poles. It is important that the adhesive surface of the tape be applied to a relatively smooth and even surface when the paper backing is removed. If the adhesive surface is left exposed to the air, the adhesive may crystallise resulting in the tape becoming brittle with the possibility of the tape cracking and failing. It is therefore important that the tape be applied so that a minimum of 2 layers of tape are wound around the pole. It is important that the adhesive surface of the outer layer is evenly applied over the 1st layer, and not exposed to the air.

Figure 4.1.5: Self Adhesive Tape

To install the self adhesive tape:

Notes: This is a safety device and correct installation is critical.

The external face of the band must be kept clean prior to installation to ensure it can stick to itself, and it is recommended that the roll of tape be stored in a clean container and /or protected in a resealable plastic bag.

4. Measure sufficient length of orange tape to encircle the pole at least twice, and then cut that length from the roll.

5. Fix the orange tape to either steel or concrete poles by holding the tape horizontally with the company logo correctly orientated.
6. Remove the backing paper from the leading edge and fix that edge to the pole at the designated height. While pulling gently on the tape, gradually remove the backing paper as the tape is progressively wrapped around the pole, fully encircling the whole pole at least twice so that a neat and even appearance is achieved.
7. Ensure that the outer layer of tape is pressed evenly against the inner layer so that the adhesive of the outer layer is not exposed to the air.

4.1.7.3 Stockcodes

Item	Stockcode
70mm orange self adhesive tape	179704
White paint (approved)	176429
Zinc rich Paint - cold gal aerosol	176055

5 Inspection Process - Concrete Poles

5.1 Concrete Poles Inspection Process

CONCRETE POLE INSPECTION FLOWCHART (Fig 5.1.1)

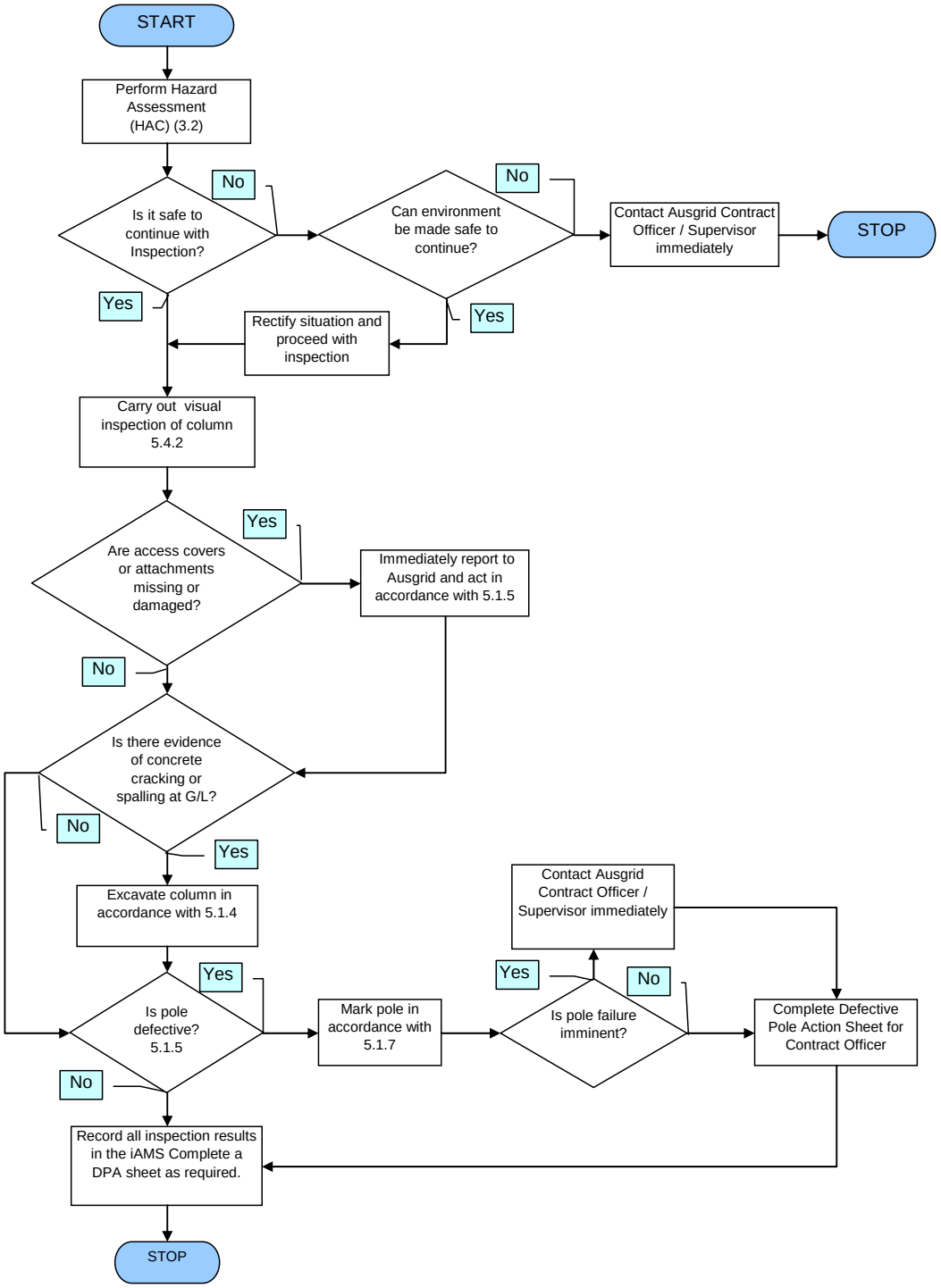


Figure 5.1.1: Concrete Poles Inspection Process

5.1.1 Concrete Poles – General

The design of Concrete Poles is such that the column's bending strength is provided by the steel reinforcement and the compressive strength by the concrete. The life of the steel reinforcement is heavily reliant on the depth of concrete coverage. The degradation process results in rusting of the steel reinforcing bars which expand and push out the concrete – commonly known as 'spalling'. Spalling is cracking and outward movement of pieces of concrete caused by expansion of the internal reinforcing steel due to corrosion (rust). It is generally caused by water infiltrating through hairline cracks in the concrete resulting in rusting of the steel reinforcement. The pole's susceptibility to corrosion is related to the depth of concrete cover over the reinforcement.

Significant strength loss does not occur until large chunks of concrete have been displaced and one or more steel reinforcing bars are fully exposed. While a strength test on such a pole may prove the pole's strength to be serviceable, it should be condemned when at least one reinforcing bar is fully exposed because degradation and strength loss will rapidly progress from this point on.

Repair of concrete poles is generally not recommended where a pole's age is close to its design life, or the concrete coverage is less than specification, however the decision to repair is an economic decision partly based on the poles replacement cost and the cost of repair and estimated additional life afforded by that repair. Where testing reveals concrete coverage to be less than specified, repair of rusted section/s is generally not recommended because further corrosion is likely to appear in other areas of the pole.

5.1.2 Above Ground Visual Inspection and Treatment Procedure – Concrete Poles

Overall visual inspection of the pole and removal of any advertising or loose surface material from within the inspection area of the pole shall be carried out, looking for above ground damage or defects. The surface of the pole shall be visually inspected for evidence of defects including those listed below.

Concrete poles and columns are to be visually inspected above ground line for the following defects:

- External condition of the concrete: spalling, vehicle or vibration damage, and/or cracking.
- Rust stains on the pole exterior.
- Rusting of fittings, etc.
- Missing or damaged access covers.
- Loose or damaged attachments such as earthing connections.

Where spalling has caused one or more reinforcing bars to become fully exposed, that is, the reinforcing bar is exposed for its full circumference, then the pole is to be classified as defective and actioned in accordance with Section 5.1.5 Defective Concrete Poles and Standards - below.

Where the steel reinforcing has been exposed, but spalling has not created a hole in the pole, and the reinforcing steel is corroded such that the diameter of the steel is 50% or less than original, the pole should also be classified as defective and treated as above.

5.1.3 Partial Excavation of Concrete Poles

It is not necessary to partially excavate around concrete poles, unless there is evidence of below ground deterioration.

5.1.4 Below Ground Inspection Procedure - Concrete Poles

Concrete Poles and Columns are to be excavated to a depth of 100mm, only where there is evidence of concrete cracking or spalling at ground line, indicating the damage may extend to the below ground section of the pole, but must not be excavated beyond 350mm. It is only necessary to excavate to just beyond the lower limit of the deterioration so the full extent of the damage can be determined. Where the damage extends beyond 350mm below ground line, it must be reported and the pole condemned.

5.1.5 Defective Concrete Poles and Standards

Where spalling has caused the reinforcing bars to become fully exposed and full depth sections of the concrete wall to fall out, the pole is to be classified as defective and actioned as outlined below.

Missing or severely damaged access covers, or loose or damaged attachments to poles, such as earthing connections, are to be immediately reported to the Ausgrid Supervisor / Contract Officer/Customer Supply Office to ensure appropriate action is taken. Complete a Defective Pole Action (DPA) Sheet. The pole is to be classified as defective and repaired where feasible, or condemned and replaced. Mark the pole in accordance with Section 5.1.7. Situations where the pole's condition is questionable should be referred to Distribution Engineering Mains Services.

Fig 5.1.2

Fig 5.1.3

Fig 5.1.4

Poles where concrete spalling is in the early stages and reinforcing bars are not fully exposed should be reported according to the following guidelines so the poles can be professionally assessed for remedial treatment or programmed for replacement:

1. Significant cracking in concrete.
2. Cracking with rust stains associated (See Fig 5.1.2).
3. Concrete bulging but not displaced.
4. Concrete displaced with top surface of steel reinforcement exposed (See Fig 5.1.3).

and the final condition

5. Spalling has caused the reinforcing bars to become fully exposed and full depth sections of the concrete wall to fall out (See Fig 5.1.4).

The report should indicate the approximate area or percentage of the pole affected.

5.1.6 Restoration of the Excavation

When restoring the excavated area around poles following inspection, it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Rocks bigger than 50mm diameter and vegetation are to be removed from the backfill material, and shall be removed from site and disposed of lawfully. All spoil that needs to be removed from the site shall be managed as per NUS174C

Environmental Procedures – Environmental Handbook for construction and maintenance.

Under NO CIRCUMSTANCES is vegetation to be placed in the excavation and covered with soil.

5.1.6.1 Unpaved Areas

In unpaved areas the inspection area around the pole is to be restored with the backfill material. Backfill the excavation in layers of 100mm, ramming each layer so as to firmly compact the soil until fully reinstated. Take care not to damage the external face of the pole. The material is to be firmly tamped with a suitable tool so that it finishes slightly below ground line. The top surface is to be then finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline. Where turf has been removed to allow excavation, undamaged turf shall be neatly reinstated on top of the compacted soil.

The work area is to be cleaned with a broom and all surplus material removed from site.

Sandy loam shall be used in all residential areas.

On private properties in rural areas, local soil found on site may optionally be used for surface reinstatement around the pole rather than importing clean sandy loam to site. The local soil may be used where:

- property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

Note: The surrounding area must be left in an 'as found' condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and pot holes be created that may present a hazard.

5.1.6.2 Paved Areas

The inspection area around the pole is to be reinstated with 50mm thick cold bituminous pre-mix material (see Figure 5.1.5: Cold Mix Installation - below) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

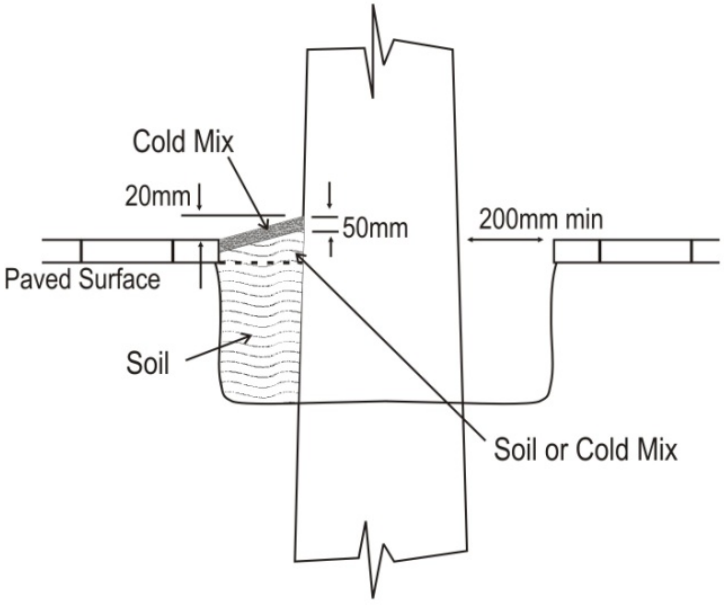


Figure 5.1.5: Cold Mix Installation

The backfill material is to be firmly tamped with a suitable tool so that it finishes approximately 50mm below the level of the pavement and all excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving. The bituminous pre-mix material is to be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence. The work area is to be cleaned with a broom and all surplus material is to be removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being carried out.

5.1.7 Marking Defective/Condemned Poles

Defective / condemned poles will be marked by the attachment of a single orange coloured 70mm wide band. This orange band is a safety warning device and it is essential that it be correctly installed so that it cannot be interfered with or become dislodged.

Defective / condemned poles are to be identified as follows (Refer Figure 5.1.6):

- Defective Poles – A single 70mm wide orange band secured around the pole at least 2.4m above ground but below 3m, encircling the whole pole, marked with Black “X X X”s and Ausgrid’s name and logo.
- Condemned Poles – A single orange band as for defective poles, plus a permanently marked “X” painted 1.8 m above ground on opposite sides of the pole (eg on the roadside and footpath faces) with the slashes of the “X” at least 500mm long, using the approved white paint (Stockcode 176429).

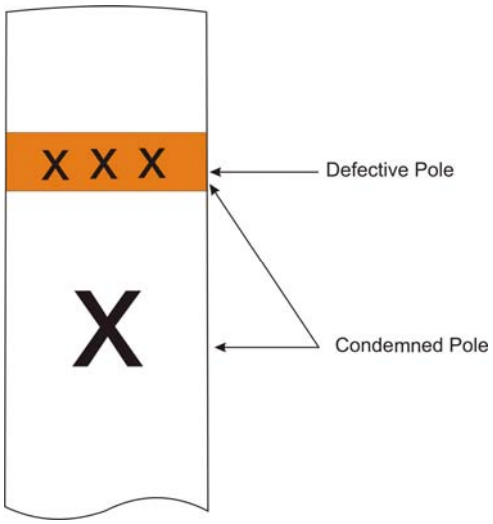


Figure 5.1.6: Defective/Condemned Pole Marking

5.1.7.1 Types of Marking Bands

There are two types of marking bands (both orange coloured and 70mm wide):

- a 1220mm long PVC plastic strip (Stockcode 180191), suitable for wood poles (not shown here), and
- a roll of self adhesive tape (Stockcode 179704) may be applied to any pole but is most suitable for concrete, fibre composite and steel poles (shown here).

5.1.7.2 Self Adhesive Tape

The self adhesive tape, shown in Figure 5.1.7, may be applied to any pole, but it is most suited to concrete and steel poles. It is important that the adhesive surface of the tape be applied to a relatively smooth and even surface when the paper backing is removed. If the adhesive surface is left exposed to the air, the adhesive may crystallise resulting in the tape becoming brittle with the possibility of the tape

cracking and failing. It is therefore important that the tape be applied so that a minimum of 2 layers of tape are wound around the pole. It is important that the adhesive surface of the outer layer is evenly applied over the 1st layer, and not exposed to the air.

Figure 5.1.7: Self Adhesive Tape

To install the self adhesive tape:

Notes: This is a safety device and correct installation is critical.

The external face of the band must be kept clean prior to installation to ensure it can stick to itself, and it is recommended that the roll of tape be stored in a clean container and /or protected in a resealable plastic bag.

1. Measure sufficient length of orange tape to encircle the pole at least twice, and then cut that length from the roll.
2. Fix the orange tape to either steel or concrete poles by holding the tape horizontally with the company logo correctly orientated.
3. Remove the backing paper from the leading edge and fix that edge to the pole at the designated height. While pulling gently on the tape, gradually remove the backing paper as the tape is progressively wrapped around the pole, fully encircling the whole pole at least twice so that a neat and even appearance is achieved.
4. Ensure that the outer layer of tape is pressed evenly against the inner layer so that the adhesive of the outer layer is not exposed to the air.

5.1.7.3 Stockcodes

Item	Stockcode
70mm orange self adhesive tape	179704
White paint (approved)	176429

6 Inspection Process – Fibre Composite Poles

6.1 Fibre Composite Poles Inspection

FIBRE CEMENT / FIBRE COMPOSITE POLE INSPECTION FLOWCHART (Fig 6.1.1)

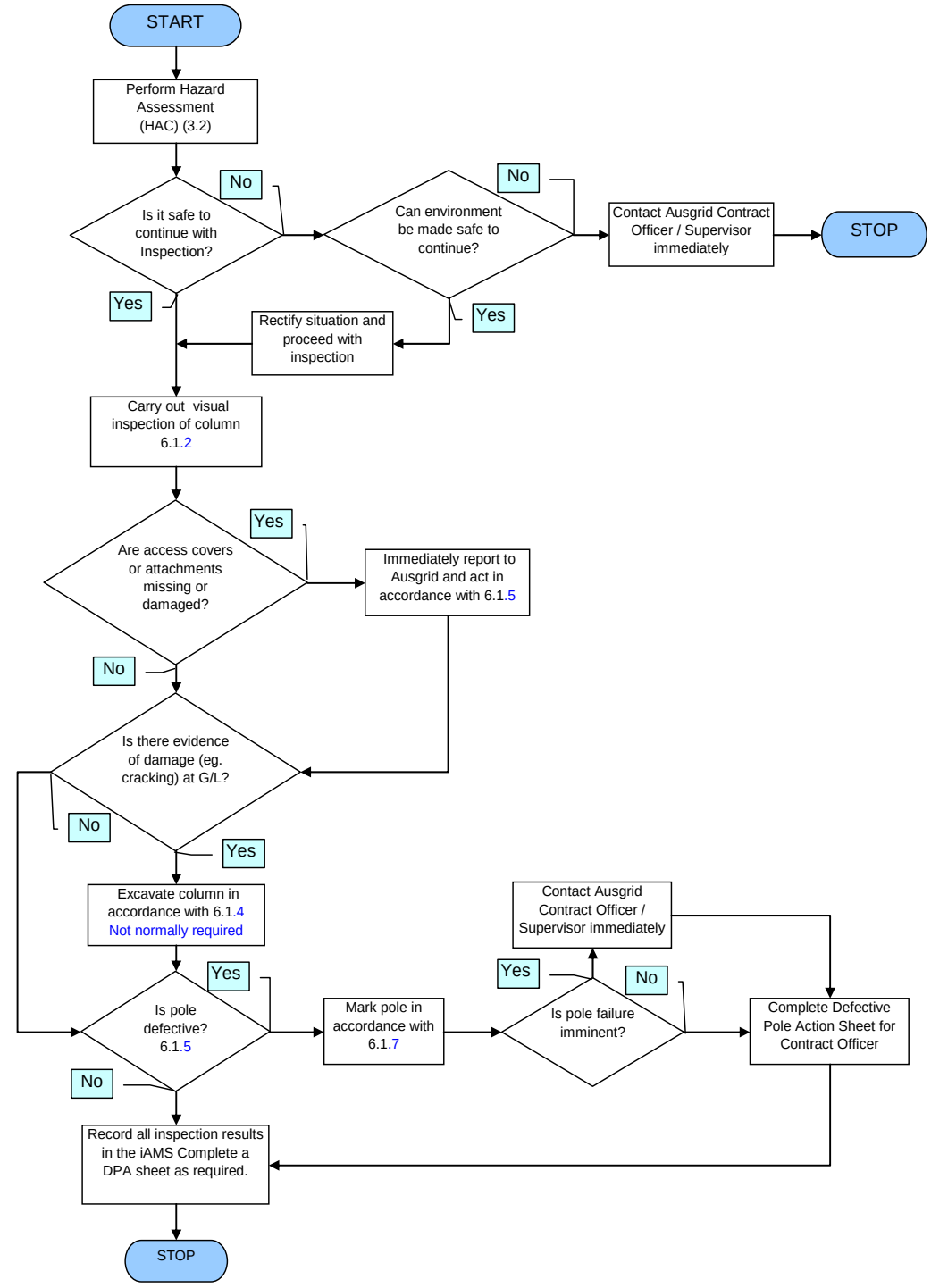


Figure 6.1.1: Fibre Composite Pole Inspection Flowchart

6.1.1 Fibre Composite Poles – General

The design of Fibre Composite Poles is such that the column's bending strength is provided by the glass-fibre reinforcement. Ausgrid has two types of manufactured fibre composite poles found on its network. They are fibre cement poles and fibre plastics poles.

These poles are thin walled structures and relatively lightweight which are highly susceptible to damage from applied excessive wall pressure. Both types of poles may be damaged by mechanical/physical impact eg contact by motor vehicle.

There is no natural degradation process known for fibre cement poles at the time this document was published.

The natural degradation process for fibre plastics poles is UV deterioration over time and they may be damaged from exposure to fire. Accordingly they should not be use in bushfire prone areas.

If a Fibre composite pole is found with minor mechanical/physical damaged it must be reported to Transmission and Distribution Mains Engineering for evaluation for suitability for repairing.

6.1.2 Above Ground Visual inspection and Treatment Procedure – Fibre Composite Poles

Overall visual inspection of the surface of the pole for damage or defects and removal of any advertising or loose surface material from within the inspection area of the pole shall be carried out.

Fibre composite poles and columns are to be visually inspected above ground line for the following defects:

- Damage / deterioration of the external surface: fibre exposure, vehicle or stress damage, and/or cracking.
- Loose or damaged attachments.

These poles have been installed on the system on a trail basis and ANY DEFECTS are to be reported to the Transmission and Distribution Mains Engineering section and the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken.

6.1.3 Partial Excavation Fibre Composite Poles

It is not necessary to partially excavate around fibre composite poles.

6.1.4 Below Ground Inspection Procedure - Fibre Composite Poles

Fibre Composite Poles are not to be inspected below ground unless there is visual indication above ground of a defect that may extend below ground. Any excavation is to be kept to a minimum (first check to 100mm before proceeding further). These poles must not be excavated beyond 350mm. It is only necessary to excavate to just beyond the lower limit of the deterioration so the full extent of any deterioration can be determined. Where deterioration is found, it must be immediately reported to the Transmission and Distribution Mains Engineering section and the Ausgrid Supervisor / Contract Officer.

6.1.5 Defective Fibre Composite Poles

Damaged or deteriorated poles or attachments are to be reported to the Transmission and Distribution Mains Engineering section and the Ausgrid Supervisor / Contract Officer for assessment. Complete a Defective Pole Action (DPA) Sheet. Mark the pole in accordance with Section 6.1.7.

6.1.6 Restoration of the Excavation

When restoring the excavated area around poles following inspection, it is essential that the methods adopted achieve a clean and tidy appearance, so as not to attract complaints. Rocks bigger than 50mm diameter may, when compacted into the backfill damage a composite fibre pole. All rocks bigger than 50mm diameter and vegetation are to be removed from the backfill material, removed from site, and lawfully disposed of. All spoil that needs to be removed from the site shall be managed as per NUS174C Environmental Procedures – Environmental Handbook for construction and maintenance.

Under NO CIRCUMSTANCES is vegetation to be placed in the excavation and covered with soil.

6.1.6.1 Unpaved Areas

In unpaved areas the inspection area around the pole is to be restored with the backfill material. Backfill the excavation in layers of 100mm, ramming each layers so as to firmly compact the soil until fully reinstated. Take care not to damage the external face of the pole. The material is to be firmly tamped with a suitable tool so that it finishes slightly below ground line. The top surface is to be then finished with clean stone-free sandy loam tamped down such that there is a 20mm slope away from the pole to groundline. Where turf has been removed to allow excavation, undamaged turf shall be neatly reinstated on top of the compacted soil.

The work area is to be cleaned with a broom and all surplus material removed from site.

Sandy loam shall be used in all residential areas.

On private properties in rural areas, local soil found on site may optionally be used for surface reinstatement around the pole rather than importing clean sandy loam to site. The local soil may be used where:

- property owners are concerned about the introduction of soil that may contain noxious seeds and weeds, or
- there is no vehicular access and it is impractical to carry soil to site.

Note: The surrounding area must be left in an ‘as found’ condition as far as possible following the gathering of soil for backfilling around a pole, and under no circumstances shall divots and pot holes be created that may present a hazard.

6.1.6.2 Paved Areas

The inspection area around the pole is to be reinstated with 50mm thick cold bituminous pre-mix material (see Figure 6.1.2: Cold mix installation - below) or, in the case of paving tiles which have been cut to fit neatly around the pole, these tiles are to be reused and left in an as found condition.

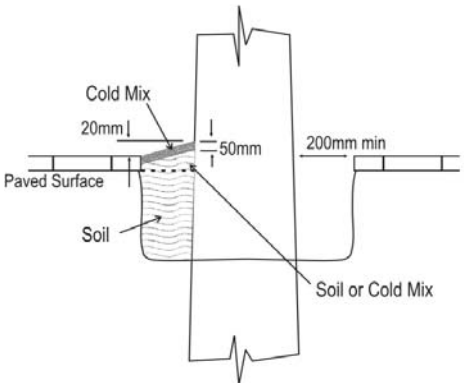


Figure 6.1.2: Cold Mix Installation

The backfill material is to be firmly tamped with a suitable tool so that it finishes approximately 50mm below the level of the pavement and all excess backfill material is to be cleaned from the surface of the pole and from the edge of the surrounding paving. The bituminous pre-mix material is to be placed such that there is a 20mm slope away from the pole towards the pavement. The pre-mix material is to finish slightly above the pavement level to allow for subsidence. The work area is to be cleaned with a broom and all surplus material is to be removed from the site.

The reinstatement of paved areas is to be completed as detailed above within 24 hours of the inspection and treatment work being carried out.

6.1.7 Marking Defective/Condemned Poles

Defective / condemned poles will be marked by the attachment of a single orange coloured 70mm wide band. This orange band is a safety warning device and it is essential that it be correctly installed so that it cannot be interfered with or become dislodged.

Defective / condemned poles are to be identified as follows (Refer Figure 6.1.3):

- Defective Poles – A single 70mm wide orange band secured around the pole at least 2.4m above ground but below 3m, encircling the whole pole, marked with Black “X X X”s and Ausgrid’s name and logo.
- Condemned Poles – A single orange band as for defective poles, plus a permanently marked “X” painted 1.8 m above ground on opposite sides of the pole (eg on the roadside and footpath faces) with the slashes of the “X” at least 500mm long, using the approved white paint (Stockcode 176429).

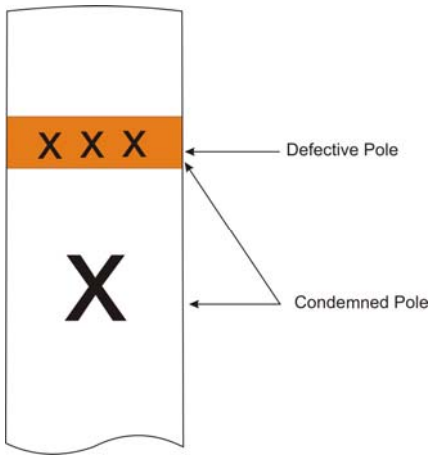


Figure 6.1.3: Defective/Condemned Pole Marking

6.1.7.1 Types of Marking Bands

There are two types of marking bands (both orange coloured and 70mm wide):

- a 1220mm long PVC plastic strip (Stockcode 180191), suitable for wood poles (not shown here), and
- a roll of self adhesive tape (Stockcode 179704) may be applied to any pole but is most suitable for concrete, fibre composite and steel poles (shown here).

6.1.7.2 Self Adhesive Tape

The self adhesive tape, shown in Figure 6.1.4, may be applied to any pole, but it is most suited to concrete and steel poles. It is important that the adhesive surface of the tape be applied to a relatively smooth and even surface when the paper backing is removed. If the adhesive surface is left exposed to the air, the adhesive may crystallise resulting in the tape becoming brittle with the possibility of the tape cracking and failing. It is therefore important that the tape be applied so that a minimum of 2 layers of tape are wound around the pole. It is important that the

adhesive surface of the outer layer is evenly applied over the 1st layer, and not exposed to the air.

Figure 6.1.4: Self Adhesive Tape

To install the self adhesive tape:

Notes: This is a safety device and correct installation is critical.

The external face of the band must be kept clean prior to installation to ensure it can stick to itself, and it is recommended that the roll of tape be stored in a clean container and /or protected in a resealable plastic bag.

5. Measure sufficient length of orange tape to encircle the pole at least twice, and then cut that length from the roll.
6. Fix the orange tape to either steel or concrete poles by holding the tape horizontally with the company logo correctly orientated.
7. Remove the backing paper from the leading edge and fix that edge to the pole at the designated height. While pulling gently on the tape, gradually remove the backing paper as the tape is progressively wrapped around the pole, fully encircling the whole pole at least twice so that a neat and even appearance is achieved.
8. Ensure that the outer layer of tape is pressed evenly against the inner layer so that the adhesive of the outer layer is not exposed to the air.

6.1.7.3 Stockcodes

Item	Stockcode
70mm orange self adhesive tape	179704
White paint (approved)	176429

7 Reports

7.1 Pole Inspection Reporting

Each Pole Inspector is issued with a MAM device to record data. While at each individual location the Pole Inspector is required to review and update master data, enter all inspection details, and create notifications. Synchronising of the MAM device should occur at the end of each working day. The use of a Master Record Sheet (MRS) is only to be considered when a MAM device is unavailable. The data will then be required to be entered by the Pole Inspection Service Provider via the SAP backend. All poles required to be immediately reported to Ausgrid will require the MAMs device to be synchronised from the site.

7.2 Recording Pole Disc / Metal ID Plate Information

The Pole Inspector must ensure all the information on the pole disc / metal ID plate is recorded including the height of the pole disc / metal ID plate above groundline. Data is to be entered into SAP / MAMS, by the Pole Inspection Service Provider.

7.3 Reporting Termite Infestations

A 'Termite Treatment Report Form' sheet must be submitted for any pole that is found to have active termites in it (sample in Appendix D). Data is to be entered into SAP / MAMS, by the Pole Inspection Service Provider.

7.4 Defective Pole Action Sheet

A 'Defective Pole Action' sheet must be submitted to Ausgrid (Contract Operations) for any pole that is identified as defective (samples in Appendix D). All poles required to be immediately reported to Ausgrid will require the Defective Pole Action Sheet to be received by Ausgrid by the close of business on the same day as the defect was found.

7.5 Maintenance Records and Statistics

All maintenance records and statistics are electronically held in SAP. Reports on the construction and maintenance history are obtainable from the SAP system.

Appendix A – Information on Ausgrid's Timber Poles

A1 Finding the Pole Disc

The positioning of the identification disc on Ausgrid timber poles is as follows:

Newcastle and Hunter areas (prior to March 1997)

Discs are fitted 2 metres from nominal ground line, which is 2 metres above ground when the pole is sunk to the standard sinking depth stipulated for that size pole in the Electricity Association specification drawing EAS 111.

Sydney and Central Coast areas (prior to March 1997)

Discs are fitted four metres from the butt.

Ausgrid area (after 1 March 1997)

Discs are fitted four metres from the butt.

Ausgrid area (prior 2014)

Discs are fitted 2 metres from nominal ground line, which is 2 metres above ground when the pole is sunk to the standard sinking depth stipulated for that size pole in the Australian Standard AS3838.11.

A2 Types of Pole Disc

A2.1 Poles 1974 Onwards

Poles purchased since 1974 are fitted with an aluminium identification disc, recessed into the timber, 4 meters from the butt.

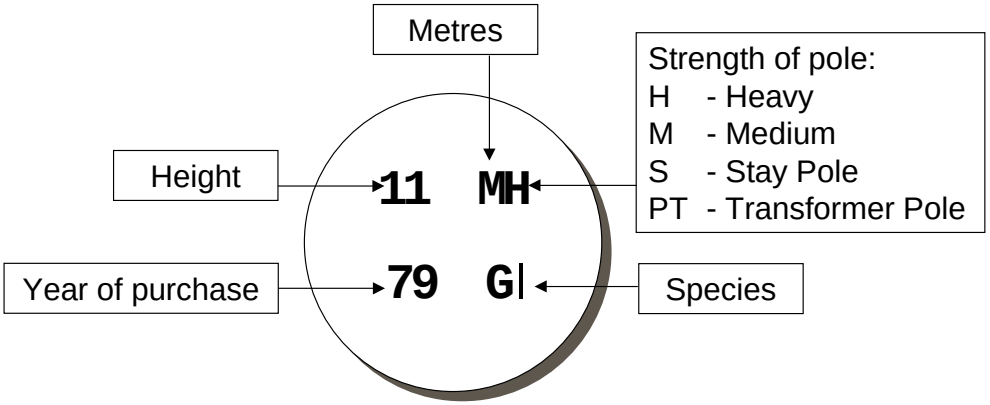
A2.2 Pre 1982 Discs

Description

Until 1982, council pole sizes were designated only by length and application. High strength poles were termed 'heavy'. The discs were 40mm in diameter and included information such as length, year of purchase and timber variety.

Diagram

Shown below is a labelled sample of a pre-1982 disc. This disc shows an 11 metre, heavy grey ironbark pole purchased in 1979.



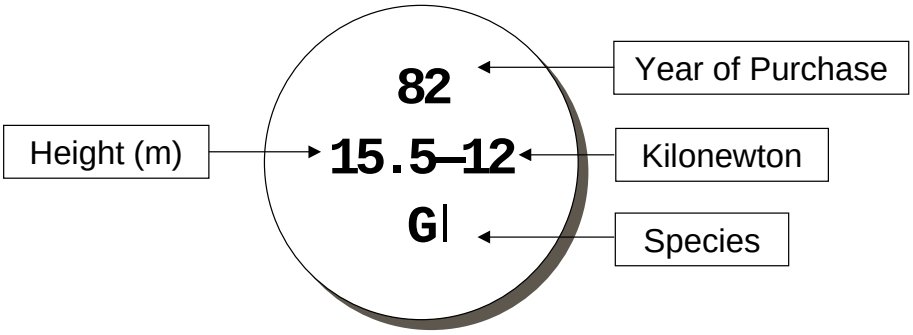
A2.3 Pre 1982 - 1988 Discs

Description

Kilonewton poles were introduced in 1982. The new identification discs were 40mm in diameter.

Diagram

Shown below is a labelled sample of a 1982 - 1988 disc. This disc shows a 15.5 metre grey ironbark pole rated at 12kN, purchased in 1982.



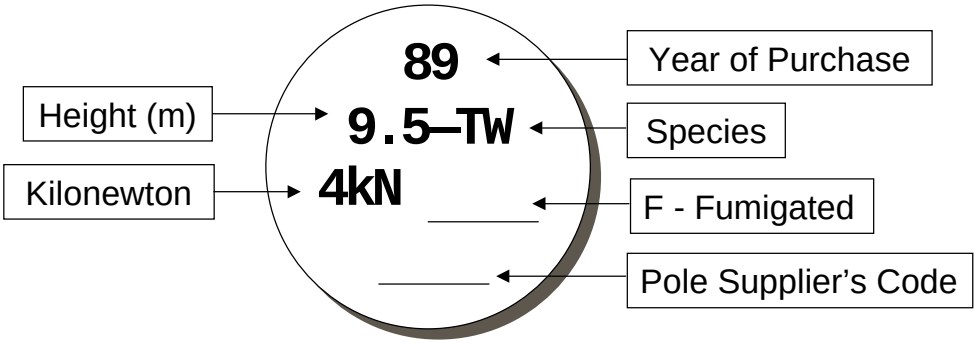
A2.4 1988 Onwards Discs

Description

A 50mm diameter disc was introduced in 1988 to enable more information to be recorded.

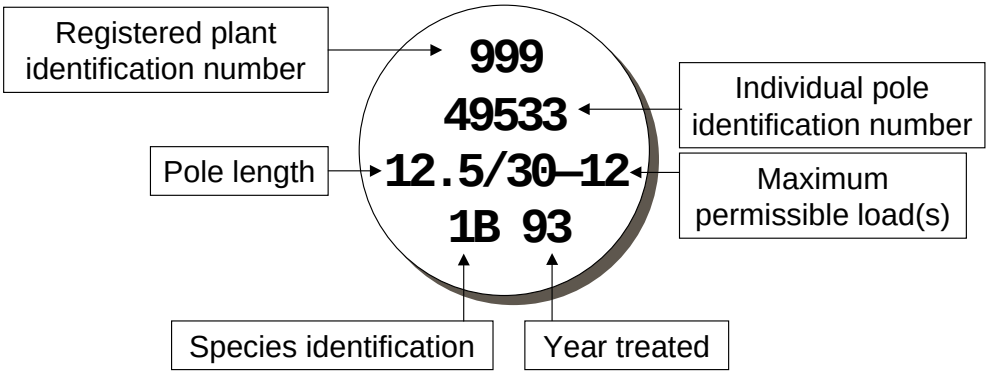
Diagram

Shown below is a labelled sample of a 1988 onwards disc. The disc shows a 9.5 metre tallowwood pole rated at 4 Kilonewton purchased in 1989. As there is no code, you can assume that the pole has not been fumigated.



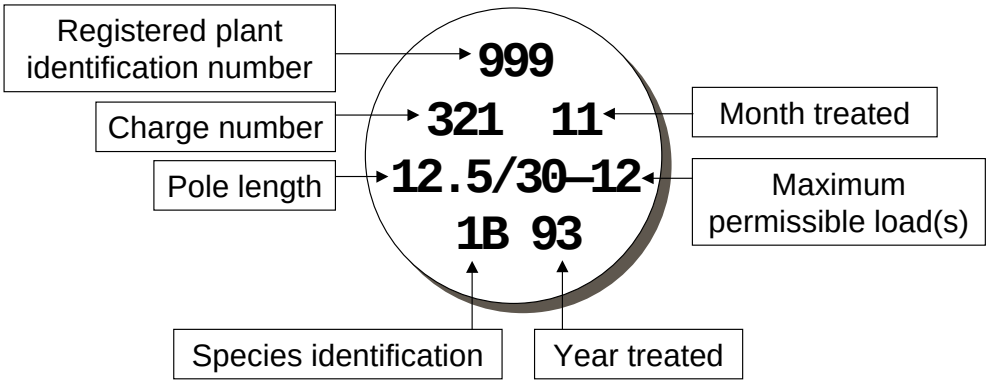
Option 1

Shown below is a labelled sample of a 1988 onwards disc (Option 1).



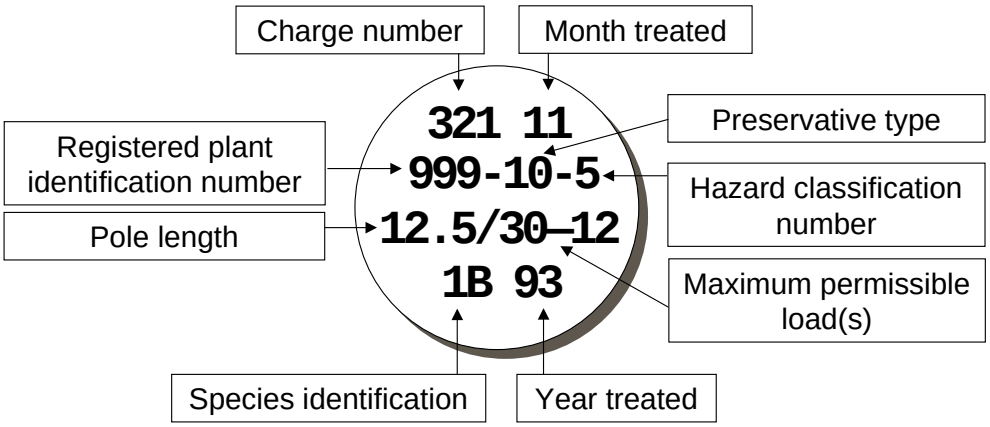
Option 2

Shown below is a labelled sample of a 1988 onwards disc (Option 2).



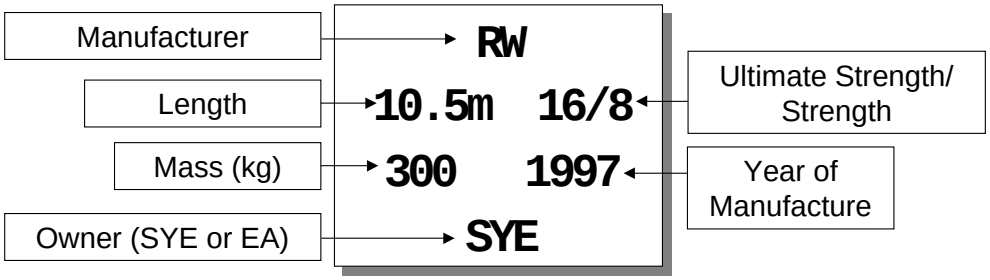
Option 3

Shown below is a labelled sample of a 1988 onwards disc (Option 3).



A2.5 Concrete Pole Disc

A diagram of a concrete pole disc is shown below.



A2.6 Abbreviations used on discs

Examples of the abbreviations used on discs include:

- m = Metre
- H = Heavy
- M = Medium
- S = Stay Pole
- PT = Transformer Pole
- BB = Blackbutt
- BS, RS, WS, YS = Stringybark
- GB = Grey Box
- GG = Grey Gum
- GM = Gympie Messmate
- GI = Grey Ironbark
- SG = Spotted Gum
- SY, SO = Blue Gum
- TW = Tallowwood
- WM = White Mahogany

For a complete list, refer to the User Guide Appendix in the SAP Training Manual.

Note: Old Mackellar district timber poles were marked with a 'T' shaped notch 10 feet from the base of the pole which is a useful indicator for determining depth in ground.

A3 Pole Species, Treatments and Properties

Ausgrid currently uses two types of timber poles:

- Desapped Durable Species timber poles in very limited numbers, and
- Full length Copper Chrome Arsenate (CCA) Pressure Impregnated timber poles.

Ausgrid uses mainly durability Class 1 hardwood timbers for power poles, however durability Class 2 are now also being purchased due the shortage of Class 1 timbers.

The majority of poles on the Ausgrid system have been treated with Creosote at some stage in their life. Creosote is a by-product from the production of coke. It contains a number of chemicals that are toxic to fungi and act as a termite repellent.

Almost all timber poles purchased since the early 1990's are full length CCA pressure impregnated.

Desapped Durable Species Timber Poles

These poles have all (or hopefully most of) their sapwood removed and are Durability Class 1 species only. They are machined to remove their sapwood because it is not durable and have an octagonal (8-sided) appearance for a length of 4.5 m from the butt, and are round dressed (ie 16-sided) for the remainder of their length. They are the strongest and most durable varieties of the eucalyptus (gum) family. Their durability comes from the chemical qualities of their heartwood, however their sapwood is not naturally protected. This sapwood when left untreated degrades rapidly and must not be included in pole strength calculations. However natural round timber poles with all the sapwood still remaining, which have not been full length pressure impregnated, can also be found in service in some areas.

Full Length Pressure Impregnated Timber Poles

These poles are debarked only with all the sapwood remaining. The full length Pressure Impregnation treatment is applied to these poles to raise their durability. The preservation treatment can only penetrate the sapwood, the heartwood being impervious to this type of treatment. The treatment fully penetrates the sapwood thereby making it highly durable and therefore allowing it to be included in the pole's strength calculation. The sapwood is commonly impregnated with one of the following treatments:

- Copper Chrome Arsenate (CCA)
- Creosote - Creosote had some advantages over CCA oxide as it reduces splitting in poles and renders the pole somewhat fire resistant. Pigmented Emulsified Creosote (PEC) treated poles, of regal species timber are in use in tidal areas where they could be subject to marine borer attack. These poles have been debarked but not desapped, and for additional protection are wrapped with Denso marine products between the high and low tide marks.

A4 Poles Reinforced with Ausmose Oz C Splint

The Ausmose Oz C Splint is a steel 'C' section channel made from 6mm thick galvanised steel. They vary in length from 3.1 to 3.4 metres and are secured to the pole using four 52mm wide galvanised steel bands.

These poles are unlikely to suffer timber failure above the reinforcement. Usually the below ground section of the pole will degrade first resulting in the pole exhibiting an abnormal lean if the attached load is unbalanced or during wind gusts. The securing bands are designed not to hold the pole absolutely rigid, they allow some movement rather than transferring all the stress to the section of the pole near the top of the reinforcement.

When the pole suffers below ground timber failure it must be replaced, however the pole cannot fall to ground and the necessity for replacement is not urgent unless the pole head movement may create a dangerous situation due to the proximity of traffic or reduction in conductor clearances.

A5 Poles Reinforced with RFD Nails

RFD nails are pressed steel section channels made from 6mm or 8mm thick galvanised steel. They vary in length from 2.4 to 3.15 metres long and are secured to the pole using four galvanised steel bolts. Poles reinforced using this product are capable of supporting twice the pole rating with no sound timber at ground line. The securing bolts rigidly hold the pole; therefore no below ground pole inspection is considered necessary, other than an examination of the steel reinforcement to check for rust. However, because the pole can remain in service with no sound timber at ground line, care must be taken when inspecting the above ground section of the pole. Particular care must be taken around the top securing bolts to ensure degradation does not continue in this section of the pole resulting in failure near the top of the reinforcement. Where a reinforced pole has been condemned for any reason, wall thickness measurements taken 400mm below the top of the reinforcement and near the bottom bolt holes approximately 200mm above groundline (sealed with Grey plastic plugs and not treated with Preschem Rod Preservatives) may be used to prioritise the pole for a replacement program.

A6 Composite Poles

Composite poles consist of a timber pole that has the section from a minimum of 300mm above groundline to the bottom of the pole, replaced with a steel reinforced concrete stub and a sliding steel sleeve, or a concrete filled steel caisson (steel tube partially filled with concrete).

In both cases the timber pole is 'joined' to the concrete filled steel tube, or concrete stub with sliding steel tube, by placing the machined down section of the pole into the steel tube (sliding or fixed).

The advantage of the concrete butt is that the pole does not have to be lifted as high, but is more expensive. Use of a caisson will necessitate the pole being lifted 0.8m to 1.35m so that it can then be lowered into the caisson. There are approximately a dozen different sizes of replacement butts depending on the size and rating of the pole to be rebutted.

Composite poles are inspected visually for termites and fungal decay in a manner similar to timber poles. In addition, the inspection hole in the steel tube near the bottom of the pole must be clear so as to allow water to drain out.

A7 How to Determine a Pole's Age for the Purpose of Maintenance

A pole's age shall be determined by the disc year value only. The month shall be ignored. For example, a CCA pole with a disk date of 1990 shall not be excavated in 2005, but excavation would be required if the inspection fell in or after 2006 (must be over 15 years old). Similarly a timber pole with a disc date of 2000 would not be internally inspected in 2005, but internal inspection would be required if inspection

fell in or after 2006 (must be over 5 years old). Except under circumstances detailed in Section 3.3.2

Appendix B – Finding the Neutral Axis

B1 Neutral Axis of a Pole

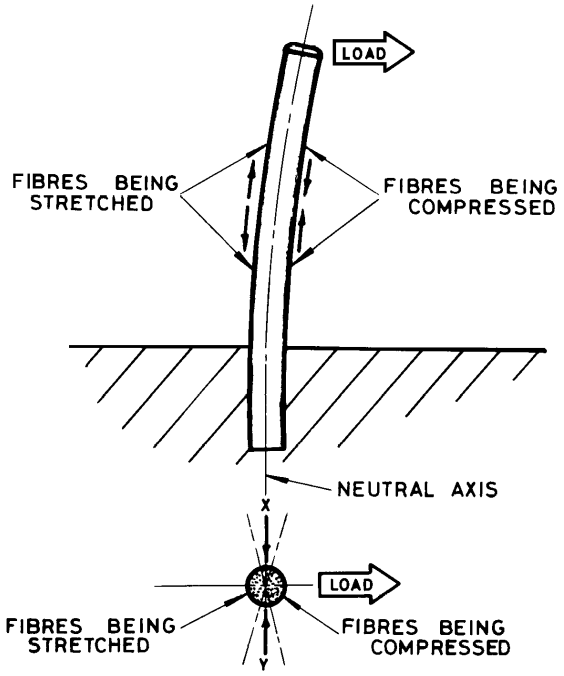


Figure B1: The Neutral Axis of a Pole

The neutral axis of a pole is an imaginary line, drawn through the pole where the timber fibres are neither in tension (being stretched) nor compression.

In Figure B1 the fibres close to the neutral axis are stretched or compressed much less than the fibres on the near-side or far-side to the load. It is important to bore the pole in a position where the fibres are least strained, ie within approximately 10 to 15 degrees of the neutral axis, as shown by X or Y.

The neutral axis is always:

- at right angles to the resultant load on the pole; or
- at right angles to the direction in which a stay wire would need to be erected to stay the pole, or 90° to the fall line of the pole.

These statements mean the same thing, since the required direction of a stay wire is directly opposite to the resultant load on the pole.

B2 In-line Pole without Service Mains

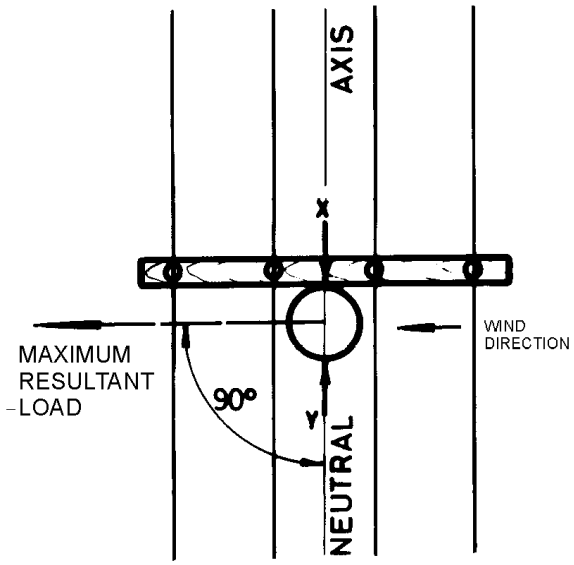


Figure B2: The Neutral Axis of an In-line Pole

Assuming the worst case of wind direction at right angles to the conductors the maximum resultant load is also at right angles to the conductors and the neutral axis is parallel to the conductors.

Bore pole at X or Y, as shown in Figure B2.

B3 In-line Pole with Service Mains

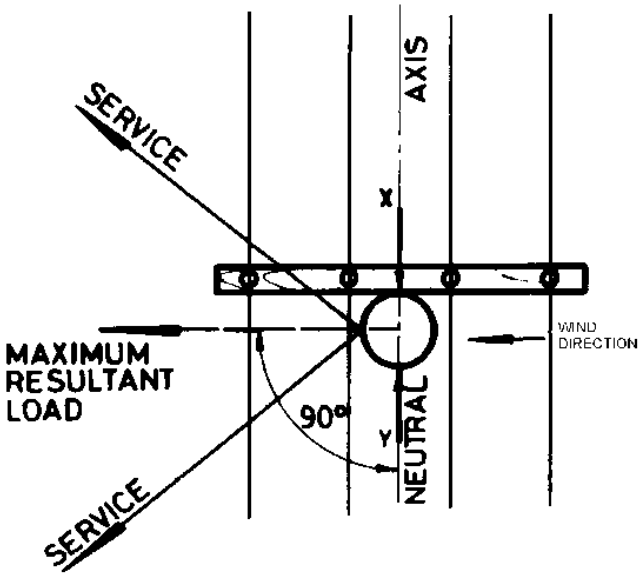


Figure B3: Neutral Axis of Pole with Services

The loading of this pole is a combination of wind forces on the pole and conductors, and tension in the service mains. Service mains may be altered many times during the life of the pole, so the actual neutral axis may vary.

As a rule, always take the neutral axis as being parallel to the line conductors.

Bore pole at X or Y, as shown in Figure B3.

B4 Angle Pole

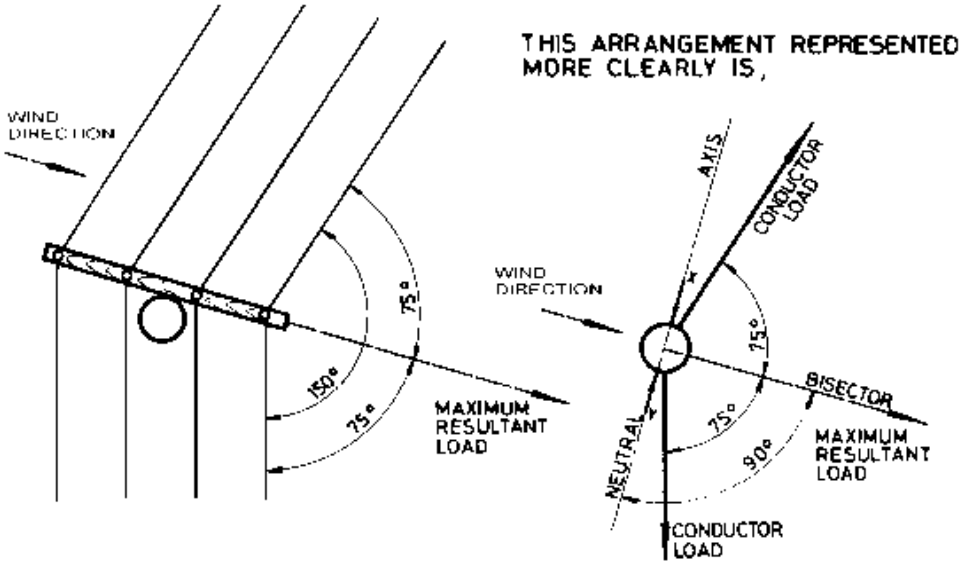


Figure B4: Neutral Axis of Angle Pole

Loading of an angle pole is a combination of wind loading on the pole and conductors and tension in the conductors.

The maximum resultant loading on the pole is in the direction of the bisector of the included angle between the conductors.

The neutral axis is at right angles to the bisector.

Bore pole at X or Y, as shown in Figure B4.

B5 Termination Pole

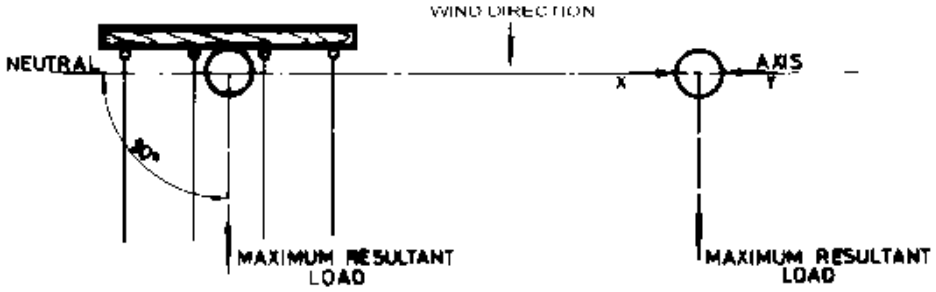


Figure B5: Neutral axis of termination pole

Loading of a termination pole is due to wind loading and tension in conductors. The maximum resultant load is directed away from the pole in the direction of the conductors.

The neutral axis is at right angles to the conductors.

Bore pole at X or Y, as shown in Figure B5.

Appendix C – Fire-Damaged and Burning CCA Timber Poles

Appendix C provides guidance for workers exposed to burning or fire-damaged Copper Chrome Arsenate (CCA) treated timber poles.

C1 Introduction

Handling CCA treated timber that has been fire-damaged, or attempting to extinguish CCA treated timber that is burning, presents hazards to the worker not found when working with other timber products.

Toxins normally locked in the timber cells during treatment are released, creating a hazard in the working environment. The following documentation provides advice to those workers who, in the course of their duties, may be exposed to either burning or fire-damaged CCA treated timber.

C2 CCA Preservative Description

CCA preservatives are water-soluble mixtures of three elemental compounds, the primary functions of which are:

- Copper - fungal decay (rot) prevention
- Arsenic - Insect (termite, borer) protection
- Chromium - fixative.

The CCA treatment of a hardwood timber pole results in full penetration of the sapwood band by the CCA solution. This causes a series of reactions which 'fix' the preservative chemicals within the cell structure of the timber.

C3 Toxins found in the Smoke and Ash from Fire-Damaged CCA Treated Timber

When CCA treated timber is fire-damaged the resulting by-products contain the following toxins:

CAUTION
Contact with these toxins must be avoided.

Smoke

Burning CCA poles will emit toxic vapours. These may include:

- Carbon monoxide
- Chromium 3
- Arsenic

Ash

The ash produced from burning CCA poles will contain:

- Arsenic
- Copper
- Chromium

C4 General Safety

Avoid smoke, fumes and contaminated charred material by staying well clear of the immediate area and remain up-wind.

C4.1 Training

If you are required to be in the area when CCA treated timber is burning or while fire-damaged material is being handled, you must be appropriately trained. Training should be equivalent to Ausgrid's training course M1429 – Handling of Burnt and Burning CCA Poles.

In general no person is to handle or disturb fire-damaged CCA treated material unless:

- the fire-damaged material must be moved or contained at that time (this may be either for safety reasons or work requirements), and
- they have received the necessary training, and
- they have the required Personal Protective Equipment (PPE).

Only appropriately trained workers should disturb CCA treated timber that is burning or has been fire-damaged. However all fire-damaged CCA treated poles must be immediately reported to the Ausgrid Supervisor / Contract Officer to ensure appropriate action is taken (ie. containment / removal). Complete a Defective Pole Action (DPA) Sheet and SAP Pole Defect Report Sheet.

C4.2 Personal Protective Equipment (PPE)

Note: All persons involved in work of this nature must use the required PPE.

All non-disposable PPE, tools and vehicles exposed to CCA contaminated smoke and ash are to be washed immediately the work is finished.

Any contaminated non-disposable overalls must subsequently be cleaned by a commercial laundry (similarly to the overalls of Pole Inspector - Termite).

At the conclusion of the work, required personal hygiene includes showering to remove any possible contaminants.

C4.3 Public Safety

In addition, the safety of the public in the immediate area around the contaminated site must be considered (ie the nature and the associated usage of the location). Where it is likely that people may come into contact with the fire-damaged material, steps must be made to ensure that contamination does not occur. These steps may include:

- Barricading the pole.
- Standing by until the fire-damaged material is contained or the pole removed. Stay out of the immediate area and up wind and warn others to do the same.

Note: Do not attempt to remove charred material from poles located where it is likely that people may come in contact with fire-dmaged material. Charred material on the pole should be contained and the pole either cleaned or removed at the first opportunity.

Examples of locations where this may be necessary are:

- outside or adjacent to a School or Daycare facility.
- in or adjacent to a shopping centre.
- in or adjacent to a park or garden.
- adjacent to boat ramps.
- bus stops or taxi ranks.

C4.4 Current Investigations

Ausgrid is currently investigating the use of high pressure water to clean fire-damaged CCA material from poles, where economic to do so, and if this service becomes available it should be considered before any fire-damaged poles are removed from service.

Appendix D – Forms

TERMITE TREATMENT REPORT FORM

Form No:.

DISTRICT / REGION: _____

GRID REFERENCE: _____

DATE: _____

1. Report of Pole Infested with Termites

Pole Identification No.: _____

Name of Private Owner/Occupier of Land (if applicable) _____

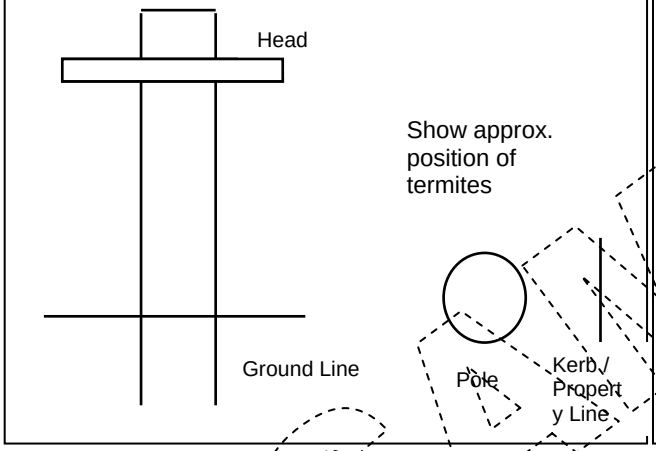
House / Lot No.: _____ Street: _____

Nearest Side / Cross Street : _____ Termite Disc Attached? YES/NO

Suburb:_____

Active Termites Detected: Above GL _____Below GL _____External_____ Internal _____

A. TERMITE LOCATIONS



B. LOCATION SKETCH – Show North Point

Company: _____

Inspectors Name: _____

Signature: _____

2. Record of Treatment

TREATMENT					FOLLOW - UP		
Name	Date	Treatment Start/Finish Times	Treatment Type	Termites Sighted?	Date	Termites Sighted	Termite Location
				YES/NO		YES/NO	
				YES/NO		YES/NO	
				YES/NO		YES/NO	
				YES/NO		YES/NO	
				YES/NO		YES/NO	
				YES/NO		YES/NO	

TERMITES ERADICATED? YES/NO **TERMITE DISC REMOVED? YES/NO**

Name: _____ Signature: _____

Version 5.0

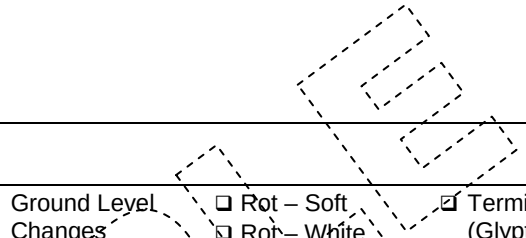
ORIGINAL

DEFECTIVE TIMBER AND COMPOSITE POLE ACTION SHEET

TO: **DPA No.:**

Date:……**Pole Number**:……

Location Sketch (show PT's, ABS's etc):



Address: House/Lot N^{o}:……

Street Name:……

Suburb:……

Pole Type: ❑ Timber ❑ Reinforced ❑ Splinted ❑ Composite

Defective Pole Assessment CAUSE:

- ❑ Bad head – general deterioration
- ❑ Bushfire
- ❑ Corrosion
- ❑ Cracking/Splitting
- ❑ Deteriorated Pole Reinstatement
- ❑ Deterioration
- ❑ Erosion
- ❑ Excessive Lean
- ❑ Failed Stay
- ❑ Ground Level Changes
- ❑ Lightning Strike
- ❑ Overtens Conductor
- ❑ Pipe
- ❑ Rot – Brown
- ❑ Rot – Soft
- ❑ Rot – White
- ❑ Rot – Unknown
- ❑ Termites – Unknown
- ❑ Termites – Sap (Nasut)
- ❑ Termites – Dry (Glypto)
- ❑ Termites – Heart (Copto)
- ❑ Vehicle Impact
- ❑ Wall thickness <70mm

Pole Details:

- ➢ **Soil:** ❑ Dry ❑ Moist ❑ Perm. Wet
- ➢ **Ground:** ❑ Bit/Concrete ❑ Pavers ❑ Grass/Soil
- ➢ **Disc Height:** ……metres

External Defects:

- ➢ **Splits:** ❑ Treated
- ➢ **Loose sapwood:** ❑ Removed
- ➢ **Knots:** ❑ Filled
- ❑ Desapping required above 2m

Condition of Sleeve / Nail / Splint Serviceable / Defective

Vehicle Damage:

- ➢ **Type of damage:** ❑ Fracture ❑ Bite
- ➢ **Severity:** ❑ Slight ❑ Moderate ❑ Severe
- ➢ **Height above ground:** ..... metres

Alignment:

- ➢ **Lean:** ❑ Leaning dangerously ❑ Leaning over curb alignment ❑ moved in ground
- ❑ > 10 ° **Lean of ……..degrees**

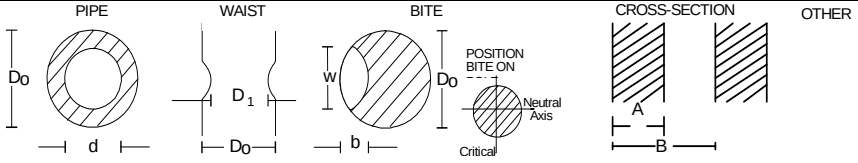
Termite Damage:

- ➢ **Active termites: Yes / No** **Report No.:** .....
- ➢ **Type:** ❑ Copto ❑ Nasut ❑ Glypto ❑ Unknown
- ➢ **Location of the termite damage on the pole:** ❑ Above GL ❑ External
- ❑ Pole considered dangerous due to termites ❑ Below GL ❑ Internal

Rot Damage:

- ➢ **Type:** ❑ Brown rot ❑ Soft rot ❑ White rot ❑ Unknown
- ➢ **Location of the rot on the pole:** ❑ Above GL ❑ External
- ❑ Pole considered dangerous due to rot ❑ Below GL ❑ Internal

Results of All Strength Calculations:



Axis (C/N)	Height above / below GL	D_0	A	B	D_1 - B	d	D_1	W	b	S%
			DATA NOT FOR SAP							
	100mm Below									
	200mm Below									
N	200mm Above									
N	800mm Above									
N	1000mm Above									

Treatment Applied: ❑ **Heart Rot Treatment** ❑ **Bandage** ❑ **Wrap** ❑ **Paste** ❑ **Nil**

Dangerous Pole: **Reported To:** …… **Date:** ……**Time**:……

Inspectors Name: ..... **Signature**: .....

REMARKS:

Contract Officer / Inspector's Recommendation: Serviceable / Re-inspect / Reinstate / Replace

Remarks:

Contract Officer / Inspector:

Name: …… Signature: …… Date: .....

DEFECTIVE STEEL / CONCRETE POLE ACTION SHEET ORIGINAL

TO: **DPA No.:**

Date:……**Pole Number**:……

Address: House/Lot N^{o}:……
Street Name:... .....
Suburb:..... .....

Location Sketch:

Pole Type: ❑ Steel – ❑ Direct Buried ❑ Rag Bolt ❑ Concrete ❑ Concrete/Bitumen Footing

Pole Assessment CAUSE ❑ Lamp head – general deterioration ❑ Corrosion ❑ Cracking / Splitting ❑ Damaged Access Cover ❑ Deteriorated Pole Reinstatement ❑ Erosion ❑ Ground Changes ❑ Spalling ❑ Vehicle Impact

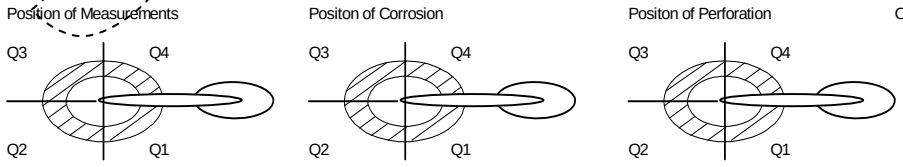
Pole Details: ➢ **Soil:** ☐ Dry ❑ Moist ❑ Perm. Wet ❑ **Disc Height:** ➢ **Ground** ☐ Bit/Concrete ❑ Pavers ❑ Grass/Soil ……metres

Concrete/Steel Pole Defects: ❑ Rust (Steel Pole) ❑ Fractures/Spalling (Concrete Pole) ❑ Pole exterior perforated ❑ Pole exterior folded ❑ **Location** ➢ Above ❑ **Height** ….. m ❑ Servc ➢ Below ❑ **Depth** ….. m ❑ Defective ❑ Damaged Access Cover ❑ Missing Access Cover ❑ Pole considered dangerous due to electrical access

Vehicle Damage: ➢ **Type of damage:** ❑ Fracture ❑ Bend ❑ Dent ➢ **Height above ground:** ➢ **Severity:** ❑ Slight ❑ Moderate ❑ Severe ……. metres

Alignment: ➢ **Lean:** ❑ Leaning dangerously ❑ leaning over curb alignment ❑ > 10° **Lean of ……. degrees** ❑ moved in ground

Results of All Strength Calculations:



Axis (C/N)	Height above / below GL	Steel Thickness Measurements					
		Location 1	**Location 2**	**Location 3**	**Location 4**	**Average**	**Reference**
	300mm Above						
		Location 1	**Location 2**	**Location 3**	**Location 4**	**Average**	**Average/ Ref %**
	mm Above						
	mm Above/ Below						
	mm Above/ Below						
	mm Above/ Below						
	mm Below						

Treatment Applied: ❑ **Cold Galvanising** ❑ **Sealer & Topcoat** ❑ **Nil**

Dangerous Pole: **Reported To:** ……

Time: …… **Date:** ……

Inspectors Name: ..... **Signature**: .....

Contract Officer / Inspector's Recommendation: Serviceable / Re-inspect / Reinstate / Replace

Remarks: .....

Contract Officer / Inspector:

Name: ..... Signature: ..... Date: .....

Appendix E – Exemption

N.S.W. Govt Gazette - **Week No. 17/2012 Friday, 27th April 2012**

WORK HEALTH AND SAFETY REGULATION 2011
(Clause 684)
Exemption Order No. 004//12

I, Tony Robinson, Director, Specialist Services Group of the WorkCover Authority of New South Wales, pursuant to clause 684 of the Work Health and Safety Regulation 2011 grant the following exemption.

Work Health and Safety Regulation 2011 Exemption Order No. 004/12

1. Name of Order

This Exemption Order is the Work Health and Safety Regulation 2011 Exemption No. 004/12.

2. Commencement

This Order commences on the 27th day of April 2012, and has effect for a period of two years from that date.

3. Exemption

Pesticide users who are staff or contractors of Ausgrid specified in Schedule 1 are exempt from clause 65 of Schedule 18B of the Work Health and Safety Regulation 2011, subject to the conditions specified in Schedule 2.

SCHEDULE 1

1. Users, the pole asset inspection staff of Ausgrid and the contractors, who use the pesticides to control termites and treat timber under instructions from Ausgrid.

SCHEDULE 2

1. The person with control of workplace or person with control of work, who authorises the use of pesticide to control termites and treat timber within the energy industry must:

a. ensure that the pesticides are only used by authorised persons;
b. meet all the relevant current requirements of the Pesticides Regulation 2009 including pesticide use notification and record keeping requirements;
c. have attained the relevant chemical user's qualification issued in accordance with Level 4 of the Australian Qualifications Framework (AQF) such as ChemCert or SMARTtrain that includes units AHCCHM401A – Minimise risks in the use of chemicals and AHCCHM402A- Plan and implement a chemical use program;
d. have undergone the Pole Inspectors Training (TAFE Course No. 27510);
e. instruct those persons in the safe use of the pesticides and ensure that any hazards identified with such use have been assessed and adequately controlled and those persons are advised of the controls;
f. be satisfied those persons can be relied upon to use the pesticides without placing the health and safety of themselves or others at risk; and
g. ensure those persons are made aware of the application and limitations of this exemption order.

2. The person so authorised to use the pesticides to control termites and treat timber, in accordance with this exemption must:

a. be not less than eighteen (18) years of age;
b. meet all the relevant current requirements of the Pesticides Regulation 2009 including pesticide use notification and record keeping requirements;
c. have attained the relevant chemical user's qualification issued in accordance with Level 3 of the Australian Qualifications Framework (AQF) such as ChemCert or SMARTtrain that includes units AHCCHM303A – Prepare and apply chemicals and AHCCHM304A – Transport, handle and store chemicals;
d. have undergone the Pole Inspectors Training (TAFE Course No. 27510);
e. be able to communicate to a level that enables them to perform their duties safely; and
f. observe safe work practices at all times whilst using the pesticides and take action to prevent any person being placed at risk.

Dated this 17th day of April 2012.
TONY ROBINSON,
Director,
Specialist Services Group,
Work Health and Safety Division,
WorkCover Authority of New South Wales

Appendix F – Ultrasonic Thickness Gauge

Ultrasonic Thickness Gauge TT100

- Easy to operate ultrasonic thickness gauge
- Suitable for all metallic and non-metallic materials
- Two Standard 5 MHz transducers included
- Sound velocity range up to 9999m/s
- Clear 4-Digit LCD display with backlight
- Display resolution 0.1mm
- Memory for 10 readings
- 5 pre-set sound velocities for repeating applications
- mm / inch selectable

Technical specifications

Measuring range(steel)	1.2mm-225.0 mm with 5MHz transducer
Measuring range for steel pipes	Min.3.0mm thickness ×φ20 diameter
Transducer frequency	Standard 5 MHz, Ø 10 mm
Display resolution	0.1mm
Calibration	4.0mm steel base plate integrated
Measurement accuracy	±(1%H+0.1) mm
Measuring units	mm/inch
Sound velocity range	1000-9999m/s
Display	4-Digital LCD with backlight
Memory	Storage of 10 thickness readings
Surface temperature	-10 δ to +60 δ
Battery indicator	Low battery voltage indicator
Power supply	2 Pcs. AA batteries 1.5V
Operation time	250 hours
Dimensions	126mm×68mm×23mm
Weight	Approx. 250g including batteries

Standard delivery

- Main unit 1
- Standard 5 MHz transducers 2
- Integrated steel calibration plate 4.0mm 1
- Batteries AA 1.5V 2
- Couplant 1
- TIME certificate 1
- Instruction manual 1
- Warranty card 1
- Carrying case 1

Optional accessories

- Probe 5Pヶ10
- Probe 5Pヶ10/90α
- Probe SZ2.5P
- Probe 7Pヶ6

Optional transducers

Probe	Frequency	Measuring range (steel)	Diameter (ヶ)	Measurement for steel pipe size	Characteristic
5Pφ10	5MHz	1.2-225mm	10mm	φ20×3mm	Standard
5Pφ 10/90°	5MHz	1.2-225mm	10mm	φ20×3mm	Standard
SZ2.5P	2.5MHz	3-300mm	14mm		Thick material/ Rough surface
7Pφ6	7MHz	0.75-60mm	6mm	φ15×2mm	Thin material

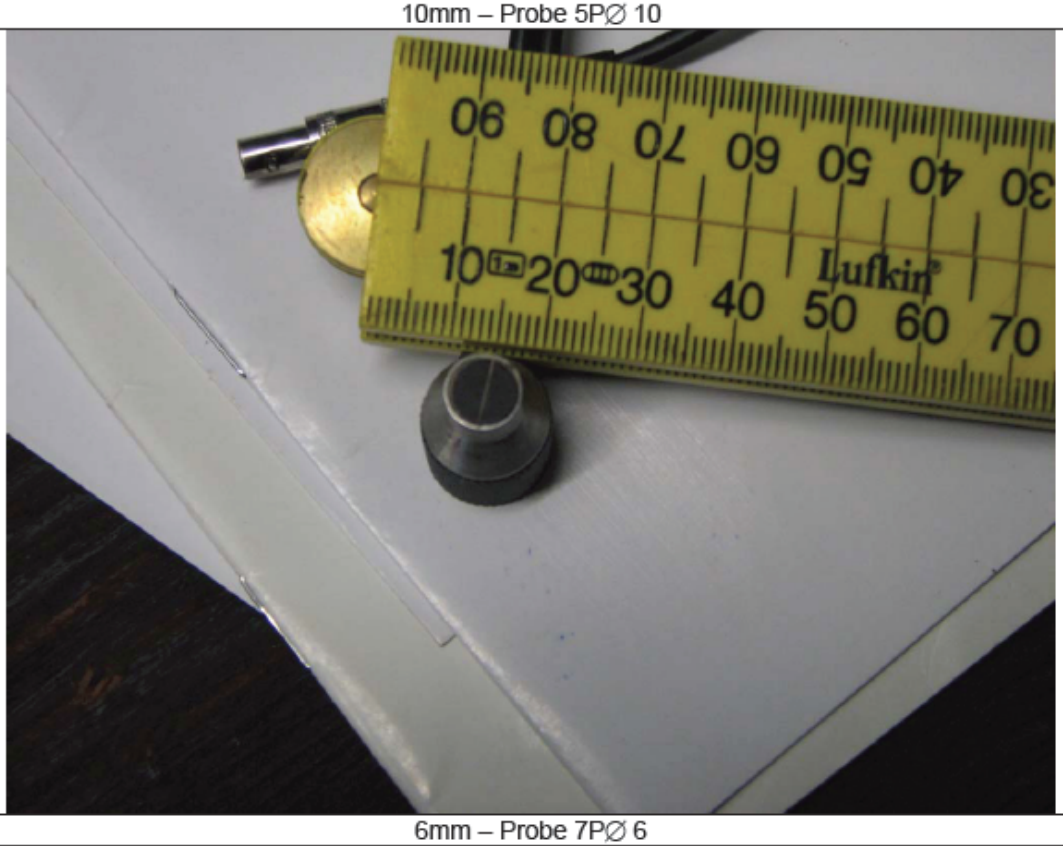
Table of sound velocity of various materials

Material	Aluminum	Iron	Copper	Brass	Zinc	Silver	Gold	Tin
Sound velocity (m/s)	6320	5900	4700	4430	4170	3600	3240	3320

Distributor:
PCWI International
13 Alhambra Avenue
CARDIFF NSW 2285
Ph: 02 4954 3900
www.pcwi.com.au

TWO DIFFERENT TYPES OF TRANSDUCERS

10mm – Probe 5PØ 10



6mm – Probe 7PØ 6

External Appendix M - Private Poles in Ausgrid's Franchise Area

Note: Appendix M is provided separate to this document.

	Revision History
As NRS145:	
Initial issue:	June 2000
Last issue:	July 2002
As NS145:	
Initial issue:	August 2006
Current issue:	June 2011

	Document Control
Authorised By: David Wilkinson	Dated: 01 June 2011
Manager Primary Systems	
Document Number:	NS145

Procurement Policy

Version 1.7

October 2014

Revision History

Version	Author	Date	Revision
1.0	Chicko Abraham		
1.01	Chicko Abraham	1 May 2009	Updated thresholds to align with delegations
1.2	Guido Sauer	2 March 2011	Ausgrid name change
1.3	Guido Sauer	2 September 2011	Update to Ausgrid official template
1.4	Andrew Fitzgibbon	29 July 2013	Remove Legal and Labour Hire from Exempt from Procurement Policy. Update Position Titles to align with current structure
1.5	Thu Nguyen	14 February 2014	Added Engagement of ASP's for Ausgrid funded Work under 1.2 Exemptions to the Procurement Policy.
1.6	Andrew Fitzgibbon	14 August 2014	Amend table in 3.1 to include revised thresholds for recommendation and to include TRC.
1.7	Andrew Fitzgibbon	20 October 2014	Remove reference to the PRP endorsing recommendation documents

Contents

1 Corporate Procurement Plan Framework

1.1 Purpose and Scope

The purpose of this document is to outline Ausgrid's minimum standards for the procurement of goods, stores, materials equipment, works and services, as well as the disposal of obsolete or surplus goods, stores, materials and equipment. Its intended audience is staff whose responsibility is to purchase, order, provide, manage and dispose of goods and services for and on behalf of Ausgrid.

The authority to take action at any stage of the procurement process is documented in Ausgrid's Delegations Policy. Divisions may develop local instructions necessary to manage administrative workflow, risk and/or process integration issues. However any such instructions must be consistent with this Policy and other Corporate Procurement procedures and instructions.

1.2 Exemptions to the Procurement Policy

The following goods and services are exempt from the Procurement Policy and are governed by policies and procedures established by the relevant function area.

Service/Goods	Responsible Functional Area
Purchase and Sale of Real Estate	Refer to Delegations Policy
Sponsorships	Refer to Delegations Policy
Donations	Refer to Delegations Policy
Engagement of ASP's for Ausgrid funded work	See below

At times there is network augmentation needed to enable the customer to connect. In many cases the work is 'minor' but it must be funded by Ausgrid as it is outside the scope of what the customer funds. In these cases, the Ausgrid funded work is included in the ASP/3 design and the work is offered to the ASP/1. This is done because the ASP/1 team on site is more than capable of doing the work. If Ausgrid arranged a team then co-ordination becomes an issue and costs increase. Using the ASP/1 to do the work is the least cost option.

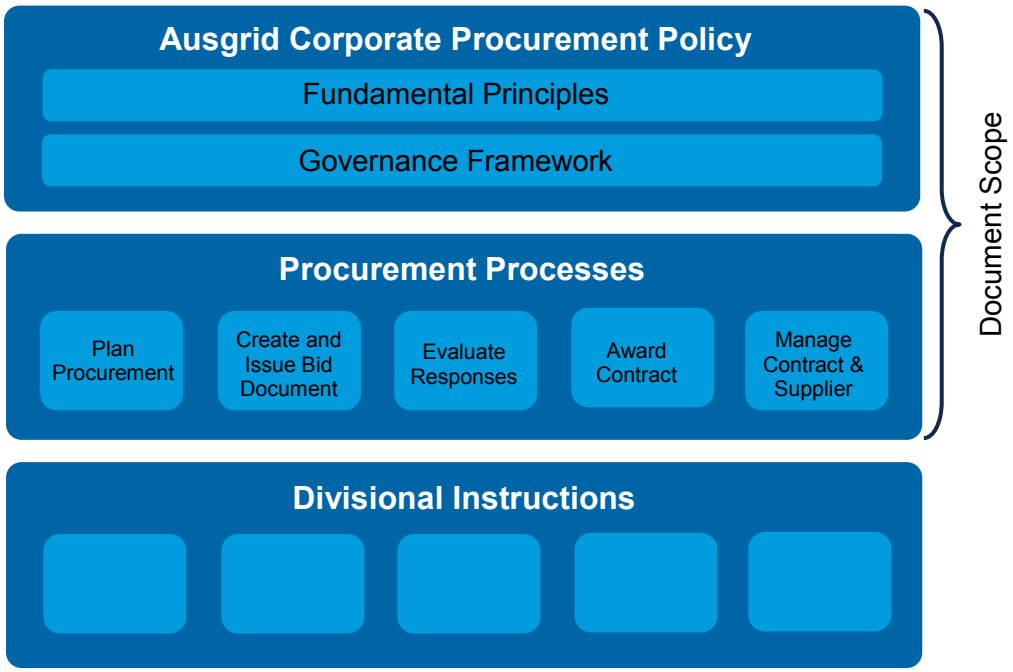
In these instances, an estimate of the cost of the work is done from ATAD (Ausgrid's estimating system).
To ensure value for money, if the price estimated to carry out the Ausgrid funded work is greater than 10% above the ATAD estimate, Ausgrid will undertake the work itself.

1.3 Roles and Responsibilities

Ausgrid's Chief Executive Officer must approve any changes to the Procurement Policy or departures from the Procurement Policy. The General Manager – People &Services or Delegate must approve changes to the Procurement Process Manual. The People and Services Division are responsible for developing, implementing and managing the Procurement Policy, the Procurement Process Manual, the Procurement Quick Reference Guide and all Procurement templates.

The General Manager of each Division is responsible for ensuring that Divisional procurement activities comply with Procurement Policy and are undertaken in accordance with the Procurement Process Manual or Divisional Instructions.

1.4 Structure of the Procurement Policy Documentation



This document outlines Ausgrid's Corporate Procurement Policy. This is the foundation upon which all procurement processes are built. The Policy consists of two parts:

- the Fundamental Principles of Procurement - the fundamental objectives of all procurement activity.
- the Governance Framework – the way Ausgrid will meet its Procurement Policy objectives.

This document should be read in conjunction with the following related Corporate Procurement documentations:

- the Procurement Process Manual - the processes that will need to be followed to comply with the procurement framework (Reference: available on The Wire)
- Procurement Quick Reference Guide - a brief outline of the main corporate policy points and a high level outline of the procurement process documented in the Procurement Process Manual. (Reference: available on The Wire)
- Procurement Templates – templates for key procurement documentations such as the Procurement Plan, Request for Tender, Terms and Conditions and Recommendation to Award document (Reference: available on The Wire)

Divisional Instructions are specific procurement processes that have been developed by the Divisions to meet any unique requirements. These instructions are developed by the Divisional Procurement Manager in conjunction with People and Services, and approved by General Manager – People and Services and the relevant Divisional General Manager. Once approved a copy of the Divisional Instruction is available on The Wire.

Questions concerning the interpretation of the requirements of this policy should be directed to the relevant Divisional Procurement Manager.

1.5 Version control and updates

The latest version of this document can always be found on The Wire.

2 Fundamental principles of procurement

2.1 Company Values

All procurement activities will to be undertaken in accordance with Ausgrid's Corporate Values and Code of Conduct. Working at Ausgrid requires employees to understand and support the corporate values. The values and their associated behaviours are the basis for everything we do.

Safety excellence

• Put safety as your number one priority
• Do not participate in unsafe acts, and challenge unsafe behaviours
• Think before you act
• Lead by example
• Take responsibility for the health and safety of yourself and others

Respect for people

• Treat all people with respect, dignity, fairness and equity
• Demonstrate co-operation, trust and support in the workplace
• Practise open, two-way communication

Customer and community focus

• Deliver value and reliable service to our customers and communities
• Use resources responsibly and efficiently
• Be environmentally and socially responsible

Continuous improvement

• Look for safer and better ways to do your job
• Improve our financial performance
• Support innovation to add value to our business

Act with integrity

• Act honestly and ethically in everything you do
• Be accountable and own your actions

The Code of Conduct supports our values by providing guidance on how to carry out duties in a lawful and ethical way; and interact with other staff and members of the public in a fair and courteous manner.

To meet its company Objectives, Values and Goals, Ausgrid's procurement activities will be conducted within a governance framework based around six key principles.

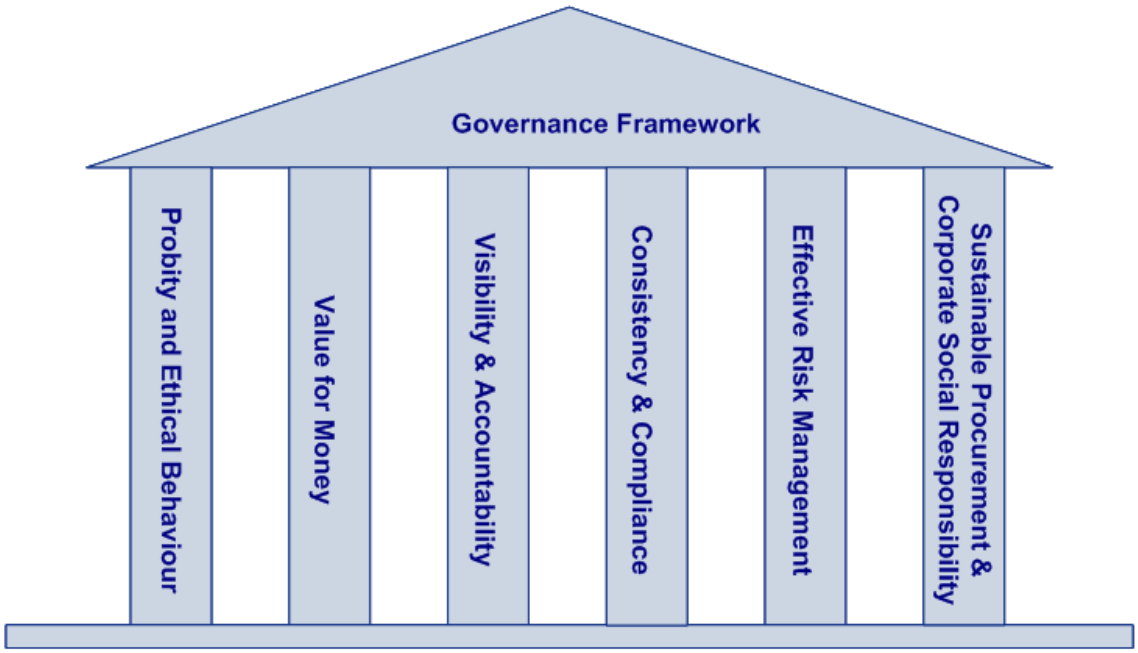


Diagram: Procurement Governance Principles

The desired outcomes of incorporating the above principles also include:

- Understanding that achieving the best possible commercial outcome involves consideration of both Ausgrid's needs and market forces.
- Valuing relationships with suppliers and striving to become a strategic client of choice in Ausgrid's major procurement areas.

2.2 Demonstrate probity and ethical behaviour

Ausgrid values the highest ethical and professional standards in all its business dealings. As such Probity and ethical behaviour must govern the conduct of all aspects of its procurement activities.

Procurement activities within Ausgrid must follow the intent of Ausgrid's Code of Conduct and Ausgrid's Statement of Business Ethics.

The following guiding principles help give Ausgrid's procurement activities its integrity:

2.2.1 Ensuring appropriately competitive process

Ausgrid aims to foster an open competitive environment in which suppliers can make attractive, innovative proposals with the confidence that they will be assessed on their merits.

2.2.2 Fair, impartial and consistent dealings with all suppliers

Suppliers are dealt within a fair, impartial and consistent manner at every stage of the procurement process.

2.2.3 Accountability and transparency of process

Procurement actions and decisions are transparent, accountable and justified to stakeholders. This involves allocating and taking responsibility for past and expected procurement activities and maintaining good records of decisions for auditing and accountability purposes.

2.2.4 Identification and management of conflicts of interest

Ausgrid's employees and advisers are required to disclose all actual, potential or perceived conflicts of interest. These disclosures are effectively managed to ensure that procurement decisions are not influenced by private interests.

2.2.5 Maintaining confidentiality of information

Sensitive information such as proposals and proponent's pricing structures are kept confidential in order to protect the integrity of the procurement process.

2.3 Value for money

Ausgrid seeks to achieve optimum value for money in all its procurement activities. This involves analysing the financial and commercial merits of suppliers and identifying the best commercial outcome.

2.4 Visibility and Accountability

Ausgrid seeks to achieve visibility in procurement demand and spend at all levels – i.e. corporate, division, program, project, contract, transaction, supplier and category levels; Ausgrid also promotes clear accountability in procurement spend management across the organisation.

2.5 Consistency and Compliance in Practice

Ausgrid aims to achieve consistent approach and practice in its procurement activities, which, at the same time, is fully compliant with Ausgrid's policies.

2.6 Effective Risk Management

Ausgrid is committed to the effective identification and mitigation of risk in its procurement activities. The application of a strong risk management process improves procurement outcomes by identifying opportunities to improve the delivery of goods or services and avoiding or mitigating losses, including reputational damage to Ausgrid.

Managing the risks of fraud and corruption is fundamental to Ausgrid's procurement risk management framework. Senior management are committed to ensuring that strong controls are in place to prevent instances of fraud and corruption and, further, that should an instance occur, adequate fraud and corruption detection and response procedures are in place.

2.7 Sustainability and Corporate Social Responsibility

Ausgrid's commitment to responsible purchasing includes conducting business in a resourceful manner and where applicable incorporating social, economic and environmental principles into its procurement activities. Ausgrid is committed to being a good corporate citizen and acting responsibly during all stages of its procurement activities.

3 Governance Framework

The Governance Framework provides the structure through which management oversight is exercised to ensure the Companies procurement objectives and policies are achieved.

The three parts of the framework are:

Procurement Review Panel (PRP): Responsible for providing procurement governance and oversight for all procurement planning activities that are of strategic nature or fall into the area complex procurement.

Tender Review Committee (TRC): Responsible for reviewing any proposal to procure goods/services from a supplier (s) in circumstances where there is an intention to enter into a contractual commitment with a supplier (s) or there is an intention to establish a panel of suppliers and the estimated contractual commitment exceeds $500,000.

Divisional Procurement Managers: The designated title for staff who are responsible for providing procurement skills and governance required to effectively manage divisional procurement activities.

Divisions: the Divisions are responsible for providing procurement capabilities, ensuring compliance to procurement policies and procedures, and implementing approved procurement strategies by effectively and efficiently carrying out procurement activities at the operational level. Designated titles involved include, but not limited to, divisional General Managers, divisional Procurement Managers, Project Managers, Contract Managers, Purchasing Officers and Business Support Officers.

The Governance Framework focuses on:

- Adherence to Procurement Policy and Processes;
- Adherence to Procurement Delegations and Ausgrid's Code of Conduct
- Achievement of Value for Money, and
- Risk Management.

3.1 Policy Requirements and Approvals

Table overleaf is a summary of the minimum Procurement Policy requirements, which apply at various threshold levels.

Minimum Procurement Requirements across threshold levels Note: For standard purchases under $100,000 and orders placed against existing AG Contracts, the Procurement Requisition Form is both the "Procurement Plan" and "Recommendation to Award Contract" document.

Policy Requirement	Order against AG Contract	Standard Procurement		Advanced Procurement	Complex Procurement
One-off, or estimated Annual Expenditure on the procurement		<$20K	$20-100K	$100-2M	>$2M
Additional criteria	Low Risk				High risk*
Registration in PACS		Required			
Procurement Documentation	Procurement Requisition Form			Procurement Plan	
Procurement Plan Endorsed by:				Procurement Manager	Procurement Manager *and* Procurement Review Panel
Number of offers to be obtained		Minimum of one verbal or written offer	Minimum of three written offers. The reason for not seeking the minimum offers must be documented in the procurement Requisition Form	As identified in the Procurement Plan	
Preferred method to issue invitations & receive responses		No Policy Requirement but E-Tender is recommended		E-Tender	
Evaluation Panel (min) and evaluation criteria		1 Officer. Evaluation criteria self-determined before seeking offers	1 Officer. Evaluation criteria self-determined before seeking offers	3 Officers, Evaluation criteria as documented in the approved Procurement Plan	
Documentation of Outcome	Procurement Requisition Form			Recommendation to Award Contract Documents	
Recommendation to award endorsed by:				>$100-500K Procurement Manager	>$500K Procurement Manager I *and* Tender Review Committee
Required approval	Delegated Officer				

Ausgrid

Procurement Process Manual
November 2014
Version 1.2.8

Last printed 8 December 2014
This report contains 47 pages
AG Procurement Process Manual V1.2.6 -140814.doc

Document review and approval

Revision history

Version	Author	Date	Revision
1.0	Chicko Abraham	5 September 2008	
1.01	Chicko Abraham	1 May 2009	Updated thresholds to align with delegations
1.2	Guido Sauer	02 March 2011	Ausgrid name and logo change
1.2.1	Chicko Abraham	28 June 2011	Expansion of section 6 to cover contract review (6.2.3)
1.2.2	Guido Sauer	31 October 2012	Adding of legal advice clause in 5.1.
1.2.3	Andrew Fitzgibbon	21 May 2013	Update risk matrix clause 3.4.1.1, update ENet to The Wire. Remove Legal and Labour Hire from Exempt from Procurement Policy; Add detail about period contract term. Clause 3.6
1.2.4	Andrew Fitzgibbon	11 June 2013	Reference to Contract Performance Measures/KPIs and sole supplier benchmarking
1.2.5	Andrew Fitzgibbon	27 June 2013	Invoice and Credit Note approval detail
1.2.6	Andrew Fitzgibbon	15 July 2013	Add Clause 6.4.3 Approval for Increases Purchase Orders Values. Add detail to clause 3.5 Receive Security
1.2.7	Andrew Fitzgibbon	14 August 2014	Amend table in 1.6 to include revised thresholds for recommendations and to include TRC. Update table in Clause 4 to reflect TRC. Update flow chart Evaluate Responses – Advanced and Complex Procurement to include TRC process. Update Table in Clause 4.4 to reflect TRC.
1.2.8	Anita Cvitkovic & David Stanfield	10 November 2014	Updates to 1.6, 3.9, 4.5, 5.1.1, 5.6, 6.3 & 6.4.4 as recommended by IA to ensure clarity for POs, and invoice approval, statements of confidentiality & conflict of interest Addition of 8 procurement approval schedule

Contents

1 Introduction

1.1 Purpose and Scope

The purpose of this document is to outline Ausgrid's minimum standards for the procurement of goods, stores, materials equipment, works and services, as well as the disposal of obsolete or surplus goods, stores, materials and equipment. Its intended audience is staff whose responsibility is to purchase, order, provide, manage and dispose of goods and services for and on behalf of Ausgrid.

All procurement activities (other than those exemptions listed in 1.2) are governed by the Procurement Policy and are described in this Procurement Process Manual.

Ausgrid's Divisions may develop local instructions necessary to manage administrative workflow, risk and/or process integration issues. However such instructions must be consistent with the Ausgrid Procurement Policy and the processes described in this Procurement Process Manual.

1.2 Exemptions to the Procurement Policy

The following goods and services are exempt from the Procurement Policy and are governed by policies and procedures established by the functional area.

- Purchase and Sale of Real Estate — Property
- Sponsorships — Company Secretary
- Donations — Company Secretary

1.3 Staff involvement

The General Manager of each Division is responsible for ensuring that all procurement activities optimise business outcomes for Ausgrid, whilst complying with its Procurement Policy and processes.

Subject to approval of a business case or funding, anyone within Ausgrid can initiate a procurement exercise. However, staff should ensure that the Divisional Procurement Manager is consulted early during the procurement planning stage. This is particularly important for high value/high risk procurement exercises.

1.4 Structure of the Procurement Process Manual

This document contains the processes that will need to be followed to comply with the procurement framework outlined in the Procurement Policy.

This document should be read in conjunction with the related documentation to the Procurement Process Manual:

- The Procurement Policy - outlining the foundation upon which all procurement processes are built, consisting of fundamental principles and the governance framework (Reference: available on The Wire)

- Quick Reference Guide - a brief outline of the main corporate policy points and an outline of the instructions related to the processes (Reference: available on The Wire)

Divisional Instructions are specific procurement processes that have been developed by individual Divisions to meet their to procurement requirements. These instructions are developed by the Divisions and approved by the relevant Divisional General Manager.

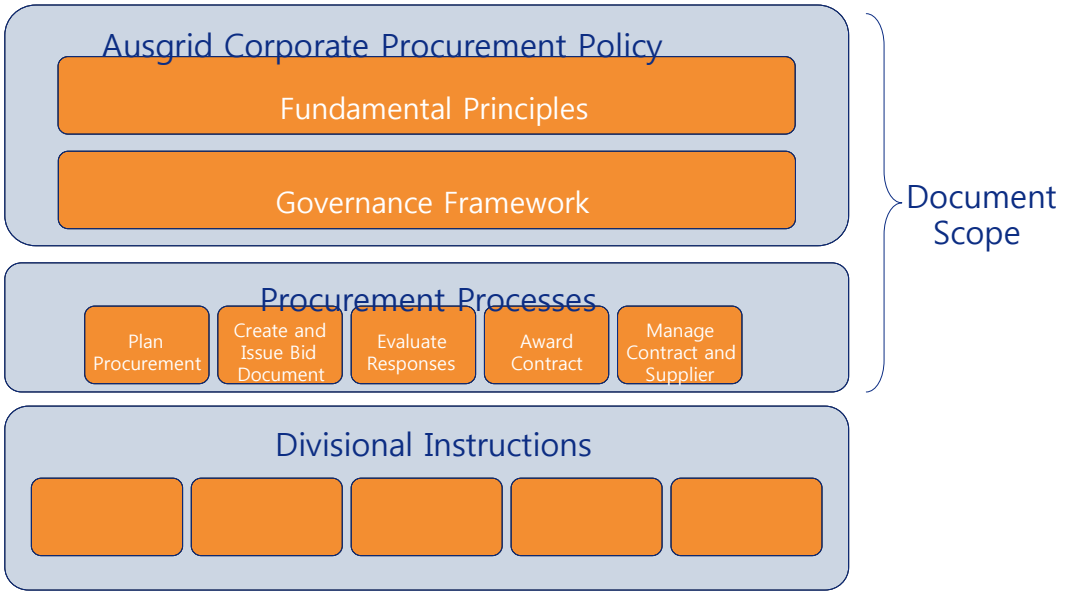


Diagram: Scope of Procurement Process Manual

1.5 Fundamental principles of procurement

Company Values

All procurement activities will to be undertaken in accordance with Ausgrid's Corporate Values and Code of Conduct. Working at Ausgrid requires employees to understand and support the corporate values. The values and their associated behaviours are the basis for everything we do.

Safety excellence

• Put safety as your number one priority
• Do not participate in unsafe acts, and challenge unsafe behaviours
• Think before you act
• Lead by example
• Take responsibility for the health and safety of yourself and others

Respect for people

• Treat all people with respect, dignity, fairness and equity
• Demonstrate co-operation, trust and support in the workplace
• Practise open, two-way communication

Customer and community focus
• Deliver value and reliable service to our customers and communities
• Use resources responsibly and efficiently
• Be environmentally and socially responsible

Continuous improvement
• Look for safer and better ways to do your job
• Improve our financial performance
• Support innovation to add value to our business

Act with integrity
• Act honestly and ethically in everything you do
• Be accountable and own your actions

The Code of Conduct supports our values by providing guidance on how to carry out duties in a lawful and ethical way; and interact with other staff and members of the public in a fair and courteous manner

To meet its company objectives and values, Ausgrid's procurement activities will be conducted within a governance framework based around five key principles.

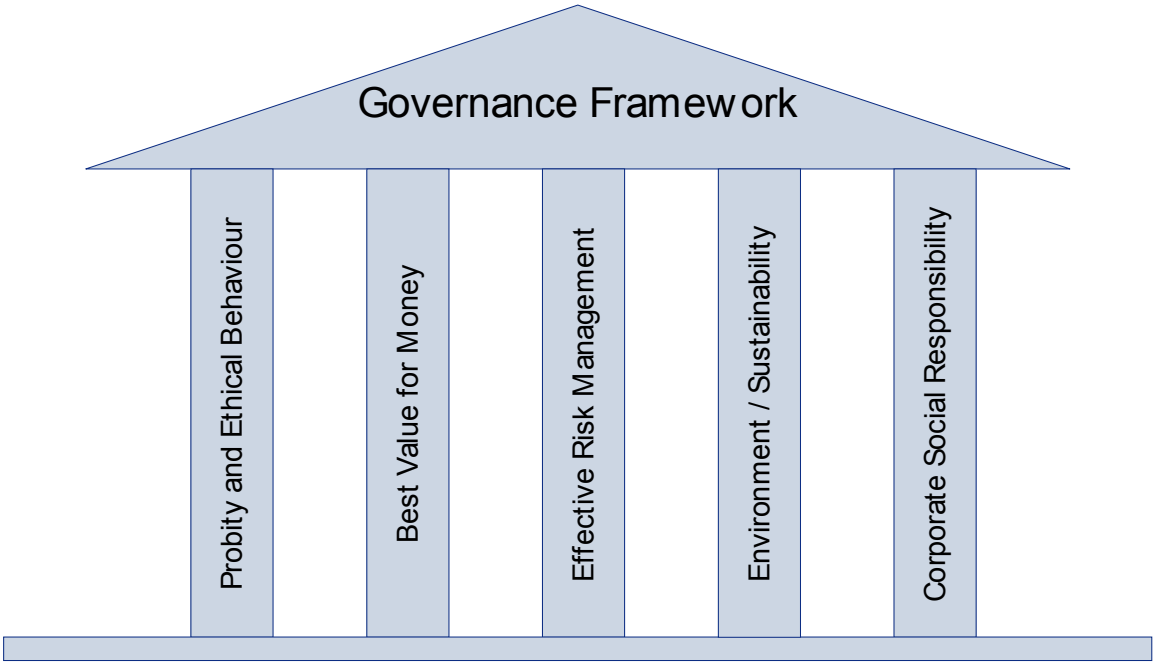


Diagram: Governance Procurement Policy Framework

The desired outcomes of incorporating the above principles include:

- Ensuring the integrity procurement activities by maintaining probity and demonstrating ethical behaviour.
- Achieving a value–for- money outcome while managing process risks effectively.
- Understanding that achieving best possible commercial outcome involves consideration of both Ausgrid's needs and market forces.
- Valuing relationships with suppliers and striving to become a strategic client of choice in Ausgrid's major procurement areas.
- Incorporating environment/sustainability and corporate social responsibility within procurement activities.

1.6 Minimum Procurement Requirements

Policy Requirement	Order against AG Contract	Standard Procurement		Advanced Procurement	Complex Procurement
One-off, or estimated Annual Expenditure on the procurement		<$20K	$20-100K	$100-2M	>$2M
Additional criteria	Low Risk				High risk [1]
Registration in PACS		Required			
Procurement Documentation	Procurement Requisition Form			Procurement Plan	
Procurement Plan Endorsed by:				Procurement Manager[3]	Procurement Manager[3] *and* Procurement Review Panel[4]
Procurement Plan Approval	Refer to Schedule 1				
Number of offers to be obtained		Minimum of one verbal or written offer	Minimum of three written offers. The reason for not seeking the minimum offers must be documented in the procurement Requisition Form [2]	As identified in the Procurement Plan	
Preferred method to issue invitations & receive responses		No Policy Requirement but E-Tender is recommended		E-Tender	
Evaluation Panel (min) and evaluation criteria		1 Officer. Evaluation criteria self determined before seeking offers	1 Officer. Evaluation criteria self determined before seeking offers	3 Officers, Evaluation criteria as documented in the approved Procurement Plan	
Documentation of Outcome	Procurement Requisition Form			Recommendation to Award Contract Documents	
Recommendation to award endorsed by:				>$100-500K Procurement Manager	>$500K Procurement Manager, *and* Tender Review Committee
Required approval	Delegated Officer				

Note: For standard purchases under $100,000 and orders placed against existing AG Contracts, the Procurement Requisition Form is both the "Procurement Plan" and "Recommendation to Award Contract" document. Purchase orders are required for all procurements. Splitting of orders into multiple orders for lower amounts is not permitted.

[1] Per PACS Risk Assessment

[2] The only exception to three quotes are in cases of emergency or market testing conducted in last 12 months.

[3] Procurement & Logistics Portfolio Manager, Manager - ICT Vendor & Sourcing, PMO Commercial Manager - ND

[4] Chairperson of PRP

1.7 Version control and updates

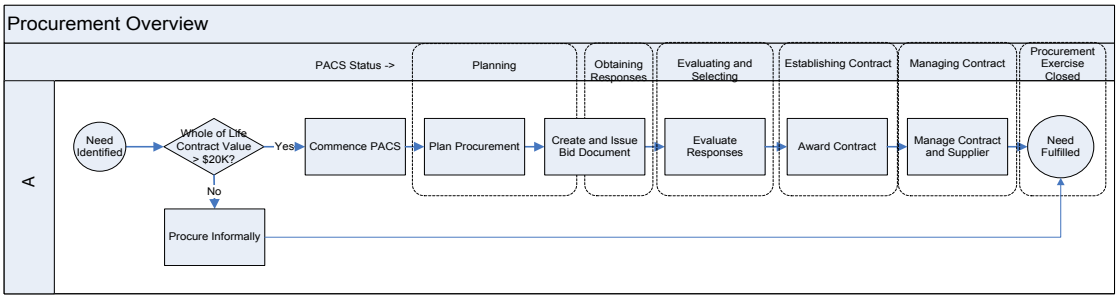
The latest version of this document can always be found on The Wire.

Any comments or suggestions on this manual should be referred to the manager PMO & Governance in Procurement and Logistics Branch, People and Services Division.

2 Process overview

The processes described in this document cover the end-to-end procurement activities aimed at meeting the organisation's needs in a disciplined manner.

The following is a high level diagram of the Ausgrid procurement process.



Detailed descriptions for each of the processes can be found in the following chapters:

Chapter 3: Plan Procurement & Create and Issue Bid Document

Chapter 4: Evaluate Responses

Chapter 5: Award Contract

Chapter 6: Manage Contract and Supplier

3 Plan Procurement & Create and Issue Bid Document

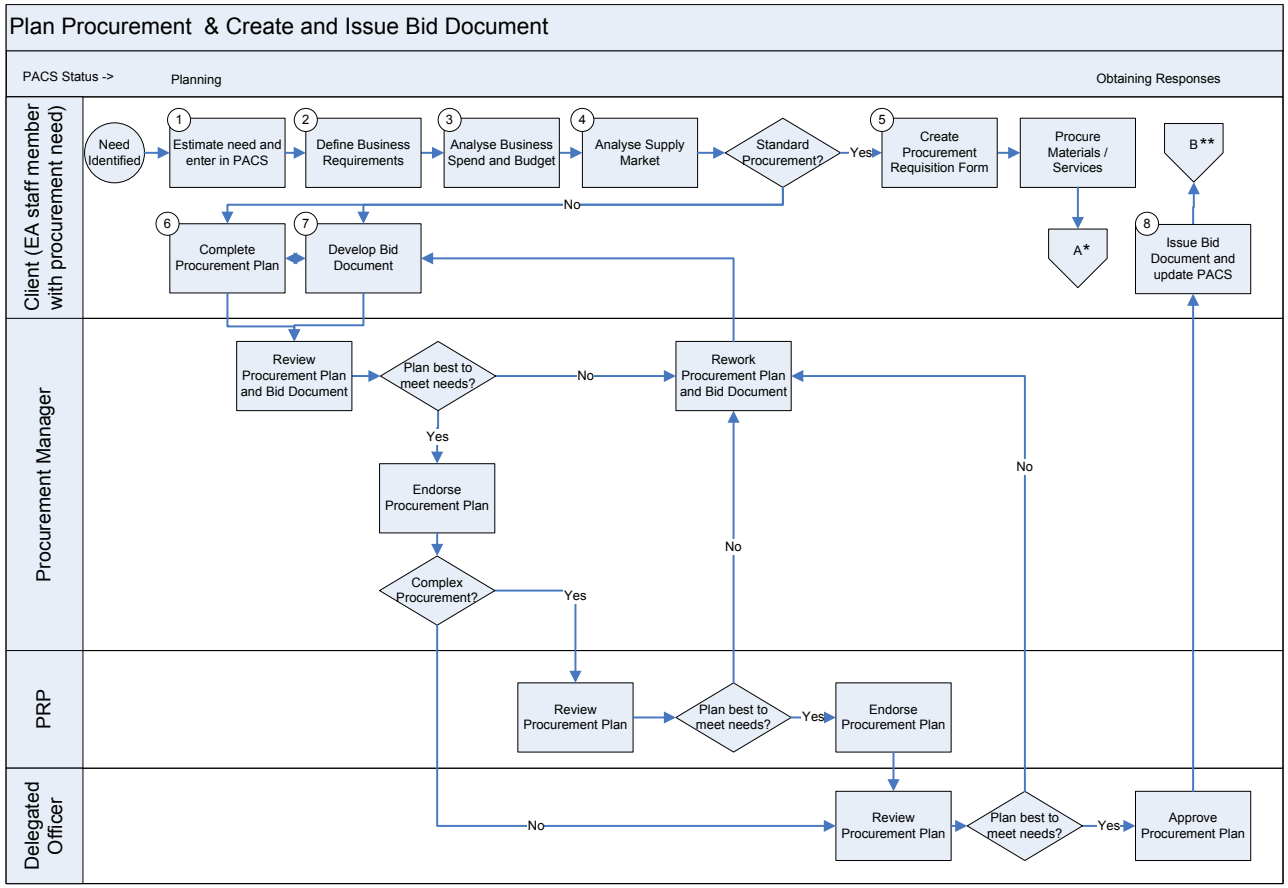
Introduction

The actions and outcomes for the Plan Procurement & Create and Issue Bid Document process and the supporting templates can be summarised as follows:

	Plan Procurement & Create and Issue Bid Document
Actions	• Define detailed business need and requirements including contract performance measures • Analyse supply market Analyse risks • Determine contract term including options for Standing Offer Period Contracts • Develop approach to market, evaluation strategy and Bid document
Outcomes	• Register in PACS • Detailed Procurement Requisition Form or Procurement Plan • Bid Document
Templates	• Procurement Requisition Form • Procurement Plan • Bid Documents All templates are available for download on The Wire

A graphical depiction of the process can be found overleaf. A detailed description of each of the process steps can be found in the subsequent paragraphs of this chapter.

Process Overview



* Links to diagram: Evaluate Responses – Standard Procurement

** Links to diagram: Evaluate Responses – Advanced and Complex Procurement

3.1 Estimate Need and Enter in PACS

The first step in the procurement planning process is to estimate the monetary value of the procurement need and register the procurement in Ausgrid's Procurement and Contracts System (PACS). This step applies to all procurement needs that are whole of life value in excess of $20,000.

Registering in PACS will generate a procurement number which will be the unique identifier for the rest of the procurement process. A PACS risk assessment tool will also need to be completed during the registration process. The tool aims to introduce risk assessment at this early stage of the procurement and prompts a number of risk factors that need to be considered and addressed when developing the procurement strategy.

3.2 Define business requirements

The majority of procurement problems can be traced back to a lack of understanding of the business requirements and outcomes. As such the contract manager (the person responsible for the procurement) should engage with key stakeholders early in the procurement planning process to define the business requirement that are to be met by the procurement exercise and obtain agreement on the required outcomes.

3.2.1 Specification definition

Once the business requirements have been agreed by the relevant stakeholders, it can be translated into a detailed specification. The specification will be incorporated into the Bid Document to communicate Ausgrid's requirements to prospective Respondents.

Specifications can be developed as:

- Functional specifications - defining the outcomes of the procurement.
- Performance specifications - defining the performance standards required.

When preparing Specifications, the following points should be considered.

- Arrange the material to be covered systematically with headings and sub-headings.
- Provide detailed definitions of the Goods or Services to be provided.
- Include performance measures/KPIs and testing parameters and/or specifications where required (including objectives, requirements, acceptance criteria).
- Define clearly all interfaces with other requirements, inputs and outputs affecting other systems or dependencies, and physical boundaries.
- Ensure that the same terms, e.g. "Respondent", "Goods", "Services", etc are used in the Specifications as in the Conditions of Tendering and Conditions of Contract.
- Refer to compliance with any relevant standard codes, in-house standards and legislation and incorporate the material into the Specifications.
- Carefully review all Specifications and drawings to eliminate ambiguity, contradictions, omissions and vagueness.
- Check the Specifications overall for completeness, correctness and consistency.

In preparing the Specifications imagine that once a Contract has been awarded there is only one contract condition that says "The Contractor must supply the Goods or Services in accordance

with the Specifications ...". Place yourself in the position of the Respondent, who has to understand your requirements. Could you understand your requirements?

While the specifications may be drafted by the Contract Manager or by technical experts it must be approved by the client or project sponsor prior to it being incorporated into the Bid Document.

Where an external party is be engaged to assist in the development of the specification, the terms and conditions of employing any such party must mitigate any potential risks such as probity, intellectual property and confidentiality.

3.3 Analyse Business Spend & Budget

Sound procurement planning is based on a thorough understanding of past and future spend, assessment of the criticality of the goods / services to be acquired.

3.3.1 Spend and budget analysis

The analysis of historical spend enables Ausgrid to understand the past pattern of acquisitions so that it can size, scope and prioritise the savings opportunities available through the procurement action.

The analysis should provide a complete picture of what has been bought, from which suppliers, by whom and what the baseline prices were.

Significant procurement opportunities are likely to be found where:

- Significant spend is not under contract
- Compliance against existing contracts is poor
- Large numbers of suppliers are used to meet similar requirements
- Spend is recorded within the separate divisions of Ausgrid without a master group contract in place
- Price volatility exists
- Problems with supply are experienced (reliability, quality, price, availability etc)

3.4 Analyse Supply Market

The aim of analysing the supply market is to assess the capacity and willingness of suppliers to provide goods or services to Ausgrid. The information gathered during this stage will assist the Contract Manager in developing the optimum procurement strategy i.e. how to engage the market and identify firms that are best suited to meet Ausgrid's requirements.

The following list of questions provides a useful framework for researching the market.

1. The degree to which suppliers compete.

- How many independent suppliers are there?
- Who are the key players and what is their market share?

3. Market stability.

- Is there a high turnover of suppliers in the market?
- How mature is the market?
- Do costs fluctuate significantly?

- Do any suppliers have obvious competitive advantages?
- Do suppliers compete on quality, service, price or other factors?
- Is there only one supplier in the market for the goods or service required?
- Is there overseas or interstate competition?

2. Ausgrid's profile in the market.

- What is our market share as a customer?
- Do suppliers find it easy to do business with us?
- What commercial relationships currently exist with suppliers in this market?
- Do we provide a platform for suppliers to increase their sales to other customers?
- Who are the other major customers in the market?
- Do we need to compete with other customers for access to supplier capacity?
- Is there any important trade, consumer, licensing or environmental legislation?
- Are there any foreseeable events that will influence the market?

4. The quality of the supply chain

- How long/complex is the supply chain?
- Are any of the suppliers dependent upon other suppliers for key components?
- Are any points in the supply chain vulnerable?
- What levels of quality control and Quality Assurance exist in the market?

5. The availability of substitutes.

- Is alternative technology available?
- Are there close substitutes?
- Is in-sourcing an option?

3.4.1 Managing risk

Risk analysis will impact on the development of procurement strategy and should be undertaken while analysing the supply market.

The Contract Manager should identify and assess the risks associated with the procurement exercise. For complex projects this is usually best achieved in conjunction with the key stakeholders and subject matter experts from Legal and Insurance.

The following list provides a useful starting point for identifying potential risks.

1. The contractual relationship.

- Disputes
- Price variations and Payment arrangements
- Performance measures
- Ownership of intellectual property
- Insurances and indemnities

2. External factors.

- Public perception
- Industrial disputes
- Interest rate or exchange rate variations
- Environmental issues
- Government regulation

3. The market.

- Market-related risks should be easily identified from the market analysis conducted in Step 2.

4. The client or project sponsor.

- Variations to requirements
- Changes to scope
- Funding

5. The supplier.

- Financial viability
- Capacity and capability
- Compliance with specification and legal requirements
- Quality systems
- Safety and environmental systems

6. The product or service.

- Quality
- Serviceability and reliability
- Compliance with requirements

3.4.1.1 Risk Assessment

Assess each of the risks by determining the likelihood of the event occurring, and the consequence of the event.

Determine the priority of each risk. The chart below is an indicative 5 stage tool for prioritising risk.

Major to Catastrophic priority risks will need to be addressed when formulating strategy.

Diagram: Risk Priority Matrix

Note: If the procurement exercise involves outsourcing any work that is currently carried out in-house the Contract Manager must consult the Divisional Procurement Manager.

The following tables should be read in conjunction with **Be Safe 10.2F (available on The Wire).**

Risk Matrix

LIKELIHOOD	CONSEQUENCE				
	Minor	Moderate	Severe	Major	Catastrophic
Very Likely	11	16	20	23	25
Likely	7	12	17	21	24
Unlikely	4	8	13	18	22
Very Unlikely	2	5	9	14	19
Remote	1	3	6	10	15

Hierarchy of Controls

The 'hierarchy of controls' is a hierarchy with the most effective risk control strategy being elimination and the least effective being the provision of personal protective equipment.

Users must work down through the list. In many instances, a combination of controls will be required to reduce the risk to ALARP.

1. **Eliminate** – remove the hazard.
2. **Substitute** – change process item to an item of less risk, e.g. substances.
3. **Isolate** – use preventative mechanism, e.g. guarding
4. **Engineer** – use machines rather than manual labour.
5. **Administrative** – develop and implement safe work procedures, conduct training, implement a checklist.
6. **Personal Protective Equipment** – use personal protective equipment, e.g. hard hats, respirators, hearing protection, insulating gloves, safety protective footwear.

Risk Rating Priorities
(Taken from Be SafePro 10.2F Hazard Assessment Check Process)

Risk Rating	Risk Range	Priority
EXTREME	23 - 25	**Immediate Priority** - Do not start work under these risk conditions, requires urgent and immediate attention.
HIGH	16 - 22	**High Priority** - Unless ALARP can be demonstrated, controls must be put in place to reduce risk level, proactive management of risk required.
MODERATE	4 - 15	**Medium Priority** - Unless Alarp can be demonstrated, controls must be put in place to reduce the risk level, actively monitor this hazard.
LOW	1 - 3	**Low Priority** - Unless there is something simple and easy you can do to further eliminate or reduce the risk, deal with other hazards first. Monitor the situation for change.

3.5 Complete Procurement Requisition Form (for Standard Procurement)

Complete the Procurement Requisition Form Template (available on The Wire)

3.6 Complete Procurement Plan (For Advanced and Complex Procurement)

A Procurement Plan must be developed for all Advanced and Complex Procurement Exercises. The aim of the Procurement Plan is to document the procurement objectives and outline the procurement strategy that will best meet these objectives. The key areas that need to be covered in the Procurement Plan are:

The Supply Market Analysis (including details of the market research undertaken and conclusions drawn for the information gathered i.e. how best to deal with the market) **Where only one supplier is known to Ausgrid, perform a benchmark with other Distribution Network Service Providers. Benchmarking may consist of price analysis or to ascertain the suitability of other similar goods or services used by the Distribution Network Service Providers that may also meet Ausgrid's requirements.**

- **The Contract Term for Standing offer Period Contracts -** The maximum term of a contract is something that needs to be assessed depending on the type and value of the procurement. Each type of procurement will be different and should be discussed with your Procurement Manager.

  Some details to consider in determining the contract term:

  1. Consider how value for money will be accessed and delivered throughout the term of the contract;
  2. What point should Ausgrid retest the market to allow other firms the opportunity to tender?
  3. Is the type of good/service you are procuring likely to change in value or capability (i.e. changes in technology result in the same services being delivered more economically or additional functionality being available for the same price)? A shorter contract term may be appropriate in this instance.
  4. Does the potential Contractor have setup and contract establishment fees to recover (including tendering costs)? Consider the costs and consider a further period for operation.
  5. Is the good/service fairly static and widely available ie many suppliers? Longer contract term maybe feasible as long as value for money can be assessed throughout the period.
  6. How long is the Lead-Time of goods?
  7. Is the contract likely to take time to setup? Ie Complexity of the relationship and start-up duration. This is dependent on what you are procuring and the market/supplier.
  8. What is the cost associated with establishing a new procurement process? Consider internal labour costs including Legal assistance etc.

If an intial period is 3 years, consider an option for a further 2 or 3 years rather than 1 year options. This shows further commitment by Ausgrid to the Contract. This again is dependent on the good/service and the business need.

- **Risk Analysis** (including the identification, assessment and management of any risks that may be posed by the procurement)
- **Strategy for Obtaining Responses** (including the Specification, Conditions of Contract and Bid Document)
- **Evaluation Plan** (including the Evaluation Panel, criteria and weightings)
- **Establishing the Contract** (including the nominated acceptance instrument and Delegated Officer)
- **Advising Unsuccessful Responders** (including the nominated officer/s for providing feedback)
- **Managing the Contract** (including who has the responsibility for the management of the contract and where applicable who has responsibility for vendor management and contract performance review mechanisms)

The Procurement Plan must be developed in conjunction with the Bid Document and need be endorsed by the Divisional Procurement Manager/ Procurement Review Panel prior to it being approved by the Delegated Officer as per Schedule C of the Delegations Policy.

Any variations from the standard procurement requirements should be clearly stated and explained, and approved by the relevant designated officer in accordance with the Delegations Policy.

3.6.1 Evaluation Criteria definition

The evaluation criteria must be established so that it will assist in differentiating the various offers and facilitate the selection of the Response that represents the best value for Ausgrid.

Evaluation criteria fall into one of three types: Mandatory, Financial and Effectiveness.

3.6.1.1 Mandatory criteria

Mandatory criteria are criteria that Respondents must comply with before its offer can be considered further. The commonly used mandatory criteria are:

- Attending site visit;
- Attending tender briefing;
- Compliance with specific contract terms and conditions which are crucial to required goods or services;
- Compliance with certain statutory requirements, Australian Standard, industry association membership, qualification and certification which are crucial to the required goods or services; or

- Meeting specific technical specification of the required goods or services.

Using mandatory criteria must be considered carefully since this is a culling mechanism that cannot be deviated once it is published in the Bid Documents. If a Respondent is unable to meet with a Mandatory Criterion, its Response **cannot** be considered **under any circumstance**.

3.6.1.2 Financial criteria

The financial criteria aims to assess the costs associated with the goods / services to be acquired. In many cases this may just be the price that is offered by the Respondent. However consideration may need to be given to other costs such as transition costs, training costs, maintenance cost, termination costs or whole of life cost assessments. The Bid Document should highlight all costing elements that will be taken into consideration as part of the financial assessment of any responses.

3.6.1.3 Effectiveness Criteria (Non-Financial criteria)

The aim of the Effectiveness criteria is to allow the evaluation panel to assess the competence and capabilities of Respondents.

There are a range of criteria which can be used to assess the effectiveness of a Respondent such as:

- Understanding of the project scope
- Resources capability
- Project methodologies and planning
- Past relevant experience and performance
- Ability to meet project timetable
- Management systems related to quality, occupational health & safety and environmental requirements
- Management and technical skills
- Maintenance, support and warranty
- Technical solution.

The above list is for reference only.

3.6.1.4 Example evaluation criteria

The following are some examples of evaluation criteria:

Technical	**Financial**
• compliance with the specifications and statement of works; • fitness for stated purpose; • technical merit of product/solution; and • ability to provide support and maintenance;	• unit or lump sum price; • delivery costs; • installation costs; • payment terms/payment schedule on overall price; and • discounts for early payment.
Company	**Quality**
• past experience and track record with Ausgrid; • capacity to perform; • capability to perform; • delivery record; and • reputation in industry via customer feedback or	• quality assurance accreditation;

reference checks.	
Service and Warranty • warranty; • back-up/support/service/repair; and • availability of spares;	**Legal and Risk** • compliance with Ausgrid terms and conditions; and • Financial viability.

3.6.2 Evaluation method and process

Evaluation method chosen should allow Ausgrid to identify the Response that achieves the best value for the money spent. Least Cost, Numerical Scoring, and Weighted Scoring are some of the evaluation methods that may be used. The Divisional Procurement Manager is best placed to assist in developing the best evaluation method and process for each procurement exercise.

The procurement plan should set out responsibilities in the evaluation timetable and detail the processes that will be followed when evaluating Responses. The plan should be aligned with the invitation documentation so that the guidelines for evaluation are consistent with the evaluation criterion specified in the invitation documentation. The plan should not be changed after release of the invitation documentation without endorsement from the PRP and approval from the Delegated Officer.

3.6.3 Procurement Plan documentation

The Contract Manager is responsible for documenting the Procurement Plan. When writing the Plan it is helpful to remember that the document will be used

- to obtain approval from the appropriate Delegated Officer
  - The document should contain sufficient detail to justify the strategies and actions being proposed.
- as a reference document for implementation
  - The document should clearly outline activities, timeframes, resource requirements and responsibilities. Remember however, that plans often need to be reviewed. Should circumstances or requirements change, variations can always be approved by the Delegated Officer.

Factors affecting the required level of detail include:

- The level of expenditure
- The level of risk
- The complexity or sensitivity of the exercise
- Any proposed departure from Procurement Policies and Procedures.

3.7 Develop Bid Document

Bid Documents should clearly convey Ausgrid's requirements including performance measures and the terms and conditions under which these requirements are sought. The key parts of the

Bid documents such as the specifications, performance measures and terms and conditions should be developed with the assistance of key stakeholders and subject matter experts such as Legal Counsel, the Insurance Manager, etc.

3.7.1 Types of Bid Document

The following are some of the types of Bid Documents that may be used to go to market:

For Standard Procurement

A specification /scope of works with the appropriate Ausgrid terms and conditions may be used as the Bid Document for Standard Procurement. This type of documentation will ensure that the procurement requirements are clearly documented and suppliers can provide a response which is targeted to the specification/scope of works.

A written Bid Document may not be required for low value, off the shelf products. These types of procurement needs can be obtained by a verbal request.

For Advanced or Complex Procurement

Expression of Interest (EOI)

An EOI is used where there is a need to cull the market to identify the most suitable firms to invite to a more detailed response. As such EOI's are part of a two stage procurement process i.e. Stage 1 – EOI & Stage 2 – Restricted Invitation to respond. Prices are generally not sought in an EOI.

Request for Tender (RFT)

RFT's are the most commonly used Bid Document. The template for this Bid Document can be obtained from The Wire.

The Divisional Procurement Manager is best placed to advise on the most appropriate Bid Document for any given procurement need.

3.7.2 Response period determination

Standard Procurement	The Contract Manager may stipulate the time period for providing responses.
Advanced and Complex Procurement	The period between the date on which the Bid Document is issued and closing date should generally be at least four (4) weeks. But this may vary depending on the complexity of the procurement process and the need to provide sufficient time to potential respondents to review the Bid Documents and provide a comprehensive response.

Note: The closing time and date must always be clearly stated in the Bid Document and in any advertising.

3.8 Issue Bid Document

Once approved the Bid Document is ready for issue to the market. The guidelines for the issue of Bid Documents are as follows:

Standard Procurement where the whole of life does not exceed $20,000	• A Bid Document need not be issued. Instead a verbal request for quotation may be issued to one supplier. • The Contract Manager must obtain at least one verbal quote to obtain approval to purchase the item.
Standard Procurement where the estimated expenditure exceeds $20,000 but does not exceed $100,000.	• It is recommended that a written Bid Document (a written specification with terms and conditions as a minimum) be issued to at least three suppliers.
Advanced and Complex Procurement.	• The number of responses to be sought and the type of process taken to obtain these responses will be as documented in the approved procurement plan.

All Bid Documents where estimated value exceeds $100K must be issued and received via Ausgrid's E-Tender service. Any alternative methods for issuing or receiving Bid Documents must be approved by the Divisional Procurement Manager well in advance of the Bid Document issue date.

3.8.1 Tender Briefings

Tender briefings are recommended for Procurement Exercises which are particularly complex, unusual or sensitive. The briefings assist in reducing the risk of Respondents misunderstanding Ausgrid's requirements and the procurement process being taken. Tender briefings provide a good forum to emphasise key aspects of the requirement, clarify and resolve any concerns that potential Respondents may have, and improve the quality of Responses. However, Tender Briefings shall not be used as an alternative to developing an appropriate Specification.

The intention to conduct Briefings should be highlighted in the advertisement and the Bid Document. Tender Briefings should be scheduled so that there is sufficient time for potential Respondents to familiarise themselves with the Bid Document before the Briefing and adequate time must be allowed for issues to be raised and addressed.

A register of attendance must be maintained by the Chairman of the Evaluation Team and a record of all questions and answers arising from the Briefing should be circulated to all attendees. Any amendments or clarifications to the Bid Document resulting from the Briefing

shall be recorded in writing and circulated to all potential Respondents. Care must be exercised during briefings to ensure that the probity of the procurement process is maintained at all times.

Attendance at Tender Briefings should generally be compulsory, however it may be optional, provided there is no risk of a prospective Respondent making a genuine claim to have been unfairly disadvantaged.

3.8.2 Site Visits

Where it is considered that Site Visits by prospective Respondents are warranted to ensure an adequate understanding of the requirements of the specification(s), such visits will be addressed in the Bid Document and shall be open to all prospective Respondents. Any Compulsory Site Visit requirements shall be addressed in all advertising.

Attendance at Site Visits should generally be compulsory, however it may be optional provided there is no risk of a prospective Respondent making a genuine claim to have been unfairly disadvantaged.

Where a prospective Respondent seeks a site visit and the request is granted, an invitation to participate shall be extended in writing to all prospective Respondents.

3.8.3 Clarifications

Any clarifications or other correspondence relating to the Bid Document, prior to the closing date, must be dealt with in a timely manner with a written response. All prospective Respondents who have been issued Bid Documents shall be advised in writing of the clarification without any identification of the party that raised the matter for clarification.

Where it may take some time to resolve the matter, prospective Respondents shall be advised of the issue in writing, including an indication of when clarification can reasonably be expected. Under these circumstances the Evaluation Panel Chair should consider whether an extension of the Closing Time is warranted.

Where there is any concern that the response may impact upon a parties' rights to confidentiality the issue must be referred to the relevant Divisional Procurement Manager.

3.8.4 Extension of Closing Date

Closing Dates should only be extended where the Contract Manager considers that it is in the best interests of Ausgrid. The revised Closing Date must be communicated to all firms who have received copies of the Bid Document.

3.8.5 Receipt of responses

Responses to Standard Procurement may be received in a manner considered appropriate by the Contract Manager but the Contract Manager must at all times ensure the control and confidentiality of the Responses.

All Responses to Advanced and Complex Procurement exercises must be received via Ausgrid's E-Tendering system. Any alternative methods receiving Responses must be approved by the Divisional Procurement Manager well in advance of the Bid Document issue date.

3.8.6 Cancellation or suspension of a Procurement Exercise

Any requirement to cancel or suspend a Procurement Exercise should be discussed with the Divisional Procurement Manager. Should the Divisional Procurement Manager agree that a suspension or cancellation is warranted, approval must be sought from the same officer who approved the Procurement Plan.

Once a cancellation has been approved, the Contract Manager shall terminate the process immediately by informing all Respondents and/or recipients of Bid Documents.

Respondents should be given the opportunity to have their Response documents returned. Should any Respondents not require the return of their Response documents, these should be destroyed and the file noted accordingly.

Where a Procurement Exercise has been suspended after the opening of Responses the Contract Manager must arrange for all Responses to be placed in secure storage until a decision is made to cancel or proceed. Under no circumstances should any AG representative discuss the decision to cancel or suspend a Procurement Exercise with any Respondent or other interested parties, nor make any public statement, until the matter has been fully resolved. In all instances the full details of this nature must be placed on the relevant official record.

Note: Where a prolonged suspension occurs, the relevant Divisional Procurement Manager shall determine what action, if any, is required to manage Respondents' expectations.

3.9 Update PACS

Once the procurement plan has been approved PACS must be updated by the Contract Manager to register the approval of the procurement plan, the date for the issue and the date for the close of the Bid Document. The approved Procurement Plan should be stored in PACS to enable visibility and maintain an accurate time scale of the procurement process.

4 Evaluate Responses

Introduction

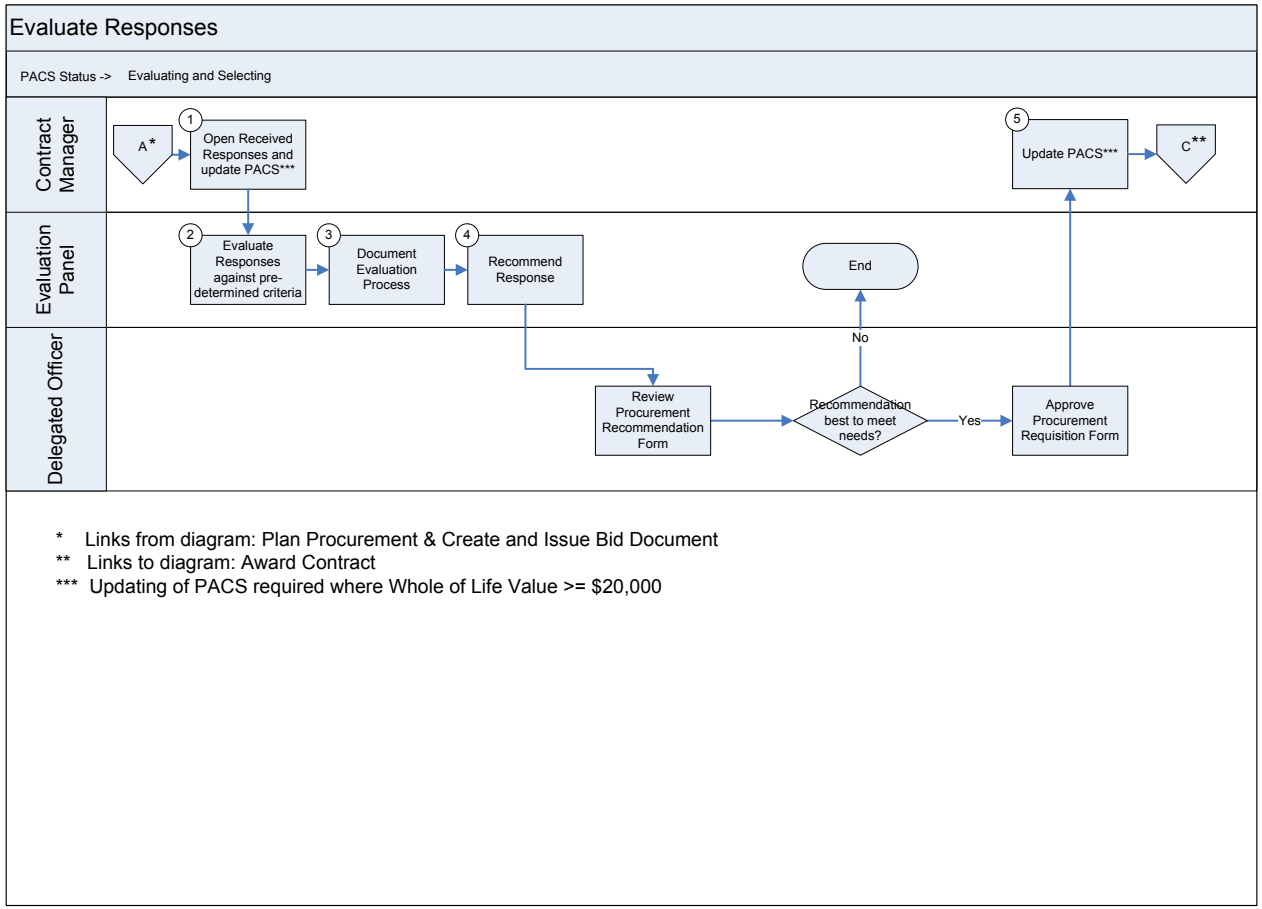
The actions and outcomes for the Evaluate Responses process and the supporting templates can be summarised as follows:

Step	**Evaluate Responses**
Actions	• Evaluate Received Responses against the predetermined evaluation criteria. • Recommend the Response that provides the best value for Ausgrid
Outcomes	• Approval to award a Contract
Templates	• Recommendation to Award template • Tender Review Committee check list and submission templates for purchases >$500K Available for download on The Wire

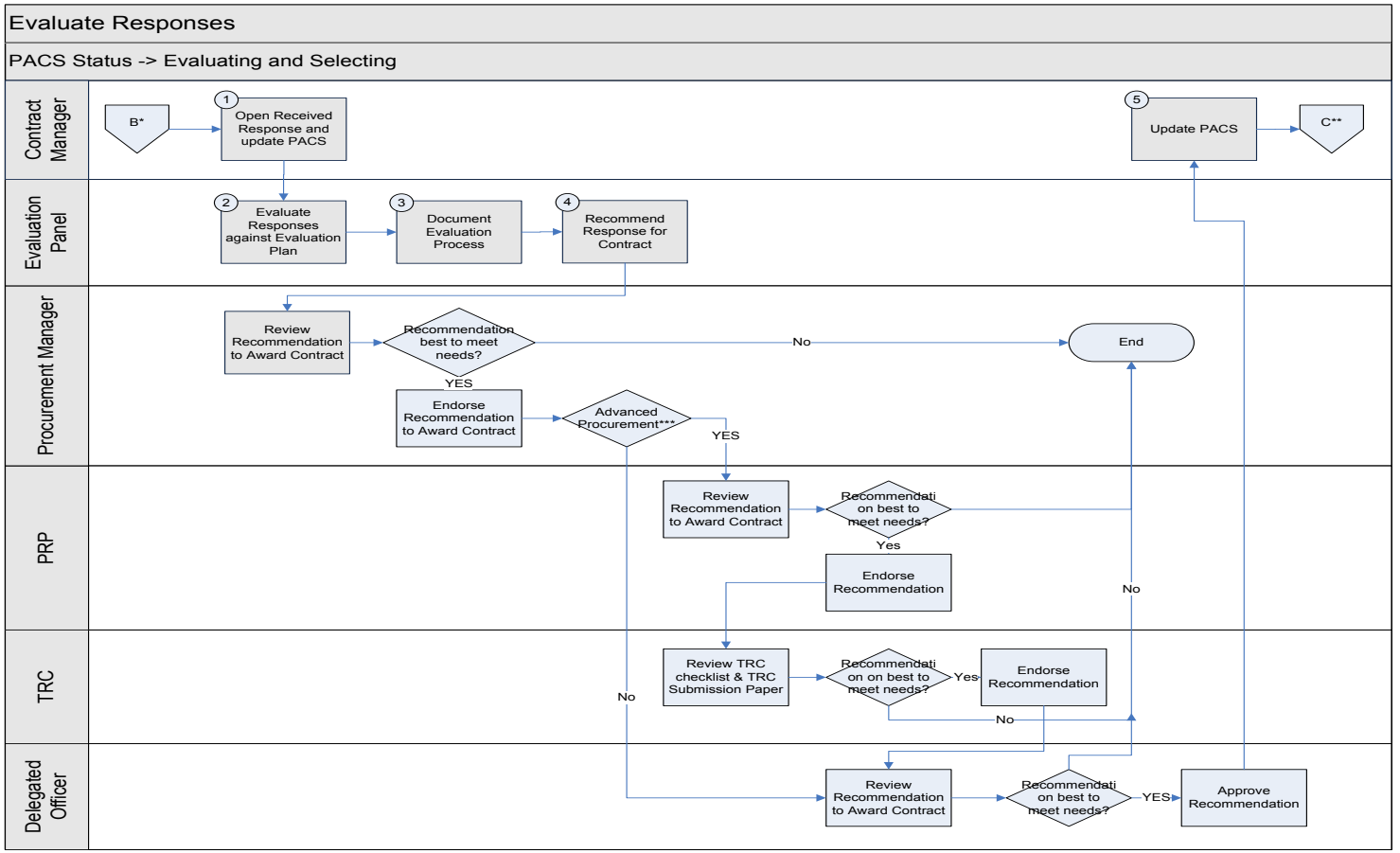
A graphical depiction of the process can be found overleaf. A detailed description of each of the process steps can be found in the subsequent paragraphs of this chapter.

Process Overview

Evaluate Responses – Standard Procurement



Evaluate Responses – Advanced and Complex Procurement



* Links from diagram: Plan Procurement & Create and Issue Bid Document
** Links to diagram: Award Contract
*** Only for purchases >$500K

4.1 Open Received Responses

After the published closing time, the Contract Manager will be able to access the responses that have been lodged for the relevant procurement exercise. The procedures for opening the responses that have been lodged are governed by procedures and policies for the mechanism that is used for lodged of Responses e.g. E-Tender, Local Tender Box (refer to The Wire for copies of the relevant procedures).

4.2 Evaluate Responses against Evaluation Plan

The Evaluation process is a highly complex activity, with substantial legal and ethical implications. It is therefore good practice to seek advice from the Divisional Procurement Managers on any issues or concerns raised during the evaluation stage.

Prior to the commencement of the evaluation process, the chairman of the evaluation panel should ensure that all panel members involved in the evaluation process sign a statement of confidentiality and a statement of conflict of interest or potential conflict of interest. Any matters concerning actual or potential conflict of interest at this stage of the procurement process should be declared to the relevant Divisional Procurement Manager and the evaluation of response should be suspended until further instructions are received from the Divisional Procurement Manager.

4.2.1 Evaluation process

The evaluation of response should be conducted in a fair, unbiased, and competent manner while maintaining confidentiality and probity.

Evaluation should be based on the Evaluation Criteria and process documented in the Procurement Plan and should:

- determine the capability of the Supplier to meet the specified criteria
- identify potential risks
- evaluate the relative strengths and weaknesses of different Suppliers
- identify for individual Supplier's key issues and priorities which should be addressed in any negotiations.

Unless otherwise identified in the approved evaluation strategy, each Response shall be assessed on a Criteria-by-Criteria basis and the results integrated to produce a combined assessment. Evaluators shall conduct such enquiries, discussions and deliberations as are considered appropriate. The final score for each criteria shall be the agreed score of all the individual members of the Evaluation Panel.

4.2.2 Clarifications

The Evaluation Panel should seek clarifications as considered necessary to remove any doubt as to what is actually offered. Clarifications shall be sought as early as possible in the evaluation process and should be made in writing.

4.2.3 Communications with respondents

Any communication with respondents must be done in such a manner that it cannot be construed by the Respondent as Ausgrid indicating some degree of acceptance of their Response. To the contrary, it should be made clear to a Respondent that other Responses are also under consideration; and that any acceptance by Ausgrid, if the Respondent was to be successful, can only be indicated by formal means.

4.2.4 Extension of the response validity date

When for any reason the Validity Period of a Response is likely to expire before the procurement process will be concluded, the Contract Manager shall approach all Respondents with a request for a universally specified extension to the validity period.

4.3 Document Evaluation Process

4.3.1 Evaluation documentation

The evaluation process should be fully documented by the Evaluation Panel and kept on the contract file. This information will be relied on when writing up the recommendation to award contract and may also be used to audit the procurement process. Score sheets, evaluation panel minutes, cost analysis, reference checks etc are some of the documents that will form part of the evaluation documentation.

4.3.2 Foreign Exchange exposure

Any foreign exchange exposure identified during the contract evaluation process must be reviewed by Finance & Compliance Division (Financial Controller) so that any decision on hedging can be made prior to execution of a Contract.

4.3.3 Samples

The Contract Manager shall maintain a record of all samples received to the relevant Response. The samples should be returned to the Respondent following the establishment of the contract, unless their retention is necessary to allow for quality checks during the life of the Contract.

Subsequent disposal of any non-returned samples shall be in accordance with procedures for the disposal of surplus stores and equipment.

4.4 Recommend Response for Contract

Having identified the best value-for-money option, the Ausgrid Recommendation to Award template should be used to document the evaluation process and the findings of the evaluation panel.

The following endorsements and approvals must be obtained prior to execution of any contract.

Standard Procurement	• No endorsement required. • The recommendation documented in the Procurement Requisition Form must be approved by the Delegated Officer.
Advanced and Complex Procurement	• The Recommendation to Award a Contract must be endorsed by the relevant Procurement Manager of the Division conducting the Procurement Exercise. • Procurement >$500K requires Procurement Review Panel and Tender Review Committee endorsement. (Procedure available on the WIRE) • The recommendation must be approved by the Delegated Officer.

4.5 Update PACS

Once Recommendation to Award has been approved, PACS must be updated with information on the whole of life value of the contract and the date that the recommendation has been approved. The Recommendation to Award (RTA) document once approved should be uploaded to PACS for reference and record keeping purposes.

5 Award Contract

Introduction

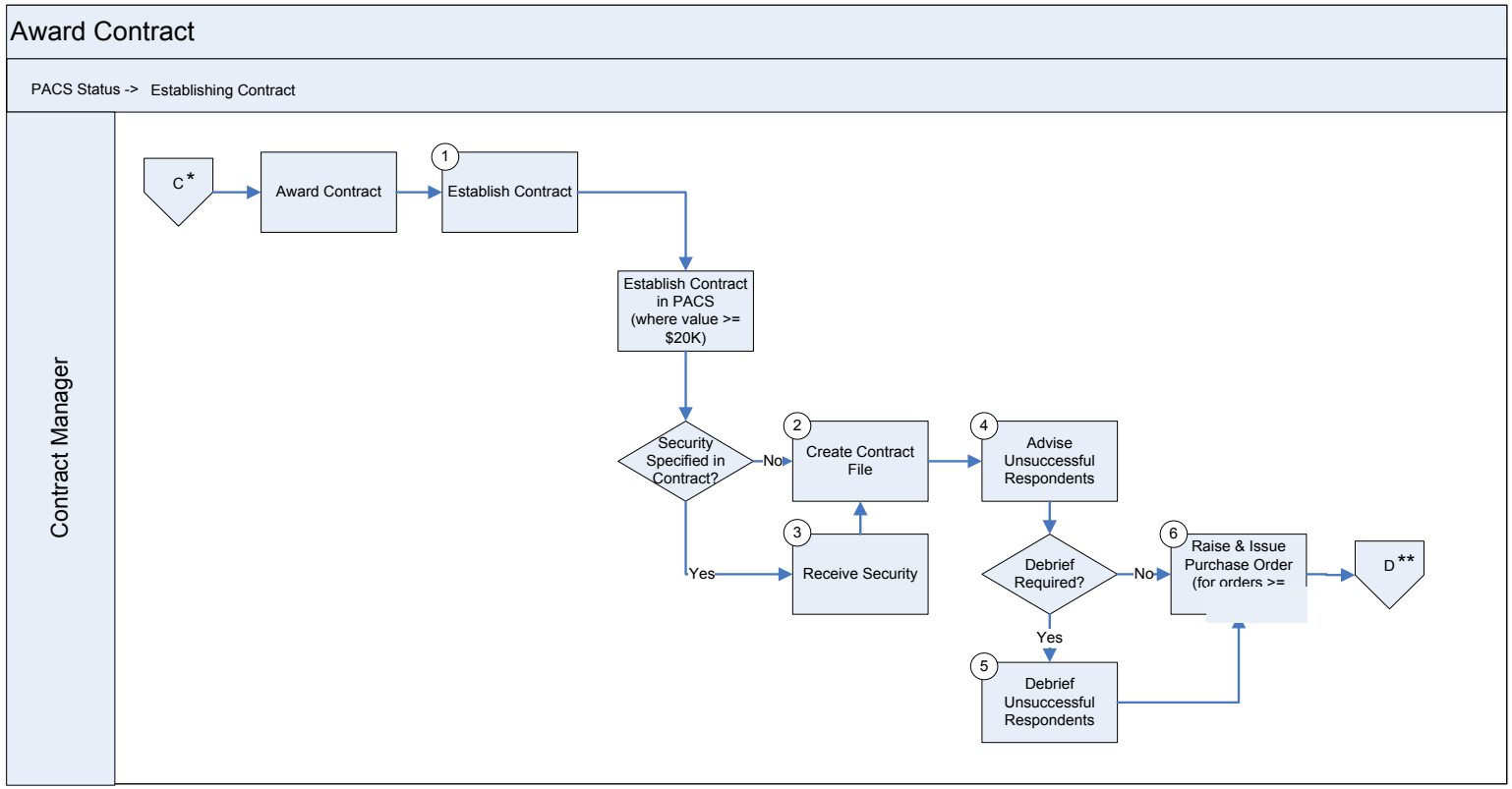
A contract can only be executed following the approval of a Recommendation to Award a Contract.

The actions and outcomes for the Award Contract process and the supporting templates can be summarised as follows:

Step	**Award Contract**
Actions	• Communicate decision to the Responders • Perform all tasks related to the finalisation of the contract
Outcomes	• Signed Contract • Letters to unsuccessful respondents and debriefings (if required). • Updating and maintaining Contract file to the life of Contract. • Update Vendor details on PACS and set up any options to extend the contract and reminders for PACS.
Templates	Refer to The Wire for Sample letters to successful respondents.

A graphical depiction of the process can be found overleaf. A detailed description of each of the process steps can be found in the subsequent paragraphs of this chapter.

Process Overview



* Links from diagram: Evaluate Responses

** Links to diagram: Manage Contract & Supplier

5.1 Award Contract

The awarding of the contract will involve the execution of the contract by both parties. The manner in which a contract will be executed will be as documented in the Bid Document. Contracts can only be executed by the Delegated Officer (Schedule C of the Delegations Policy). Legal advice is to be sought for any contracts that vary from the approved conditions of contract, which can be found on the Wire.

List of approved conditions of contract:

Short Form Goods	Long Form Goods
Short Form Services	Long Form Services
Short Form Goods & Service	Long Form Goods & Service
AS:2124	

5.1.1 Establish Contract in PACS

The Contact registration process involves requesting PACS to update the current Procurement Number to a Contract Number. The contract number generated by PACS is an extension of the procurement number with main difference being a letter at the end.

Once a contract number is issued by PACS, it can now be updated with information on the vendor, details of the contract period including options to extend contract and any reminders such as expiry date of insurances etc.

Approved Procurement Plans and Recommendation to Award (RTA) documents should be uploaded into PACS for reference and record keeping purposes.

5.2 Create Contract File

A contract file should be created to maintain all documents, correspondence and notes pertaining to the contract. This file should be regularly updated and kept in order as it will be the source of all information pertaining to the procurement exercise. The contract file will be valuable source of information for developing future procurement strategies for similar needs and will also used to manage or address any disputes that may arise in the future.

5.3 Receive Security

Where the Bid Document provides for security, and it is considered to be essential for the protection of Ausgrid's interests, an Australian Bank Guarantee (or other guarantee as is deemed acceptable by the General Manager - Finance & Compliance such as unconditional insurance performance bonds) shall be taken for the due performance of a Contract. Such security shall be issued to Ausgrid's Contract Manager directly from the Contractor's Financial Institution then lodged immediately after establishment of the Contract with Finance &

Compliance's Banking Administration Officer in the Finance Banking team. When providing the guarantee to Finance, the Contractor Manager will ensure that the contract number and the name of the responsible officer is recorded with the guarantee. No claims for payment shall be considered until the security has been lodged.

Effective July 07, unconditional Insurance Performance Bonds can be used as an alternative to bank guarantees. In that regard the following insurers have been approved by Ausgrid as acceptable issuers of Performance Bonds provided that they continue to hold an S&P (or equivalent) rating of A+ or better:

- American Home Assurance Company (ABN 67 007 483 267) - S&P rating AA+
- Chubb Insurance Company of Australia Limited (ABN 69 003 710 647) – S&P rating AA
- QBE Insurance (Australia) Limited (ABN 78 003 191 035) – S&P rating of A+
- Vero Insurance Limited (ABN 48 005 297 807) – S+P rating A+

Should any of these insurers' credit rating fall below BBB+ whilst Ausgrid holds a Performance Bond from them, the company to which this performance bond relates will be required to provide Ausgrid with either a replacement Performance Bond or a bank guarantee. Should any of these insurers credit rating fall below A+ they will no longer be deemed acceptable issuers of performance bonds and new performance bonds issued by the insurer will not be accepted.

5.4 Advise Unsuccessful Respondents

Immediately after the Contract has been successfully established, the Contract Manager should notify all unsuccessful Respondents in writing (see the pro forma located on The Wire).

Should a decision be made to not award a contract, all Respondents shall be notified of this decision by letter.

All Responses shall be retained according to the Document and Record Management Policies of the organisation.

5.5 Debrief Unsuccessful Respondents

Any request for post-tender debriefing should, in the first instance, be referred to the relevant Divisional Procurement Manager who will assist in developing a Debriefing strategy, including identification of the most appropriate Ausgrid representative to conduct the debriefing. Only authorised officers may carry out post-Tender debriefings of unsuccessful Respondents.

Where a Probity Auditor has been appointed the Divisional Procurement Manager may also require attendance of the Probity Auditor at debriefing sessions.

Post-tender debriefing should be undertaken with a helpful, open and courteous approach.

Golden rules for debriefing respondents:

- Ensure that all information provided to a Respondent can be justified
- It is essential that the Respondent understands that the discussion is being carried out with the object of mutual longer term benefits

- The Respondent should be informed that the weaknesses to be covered are those perceived by an experienced Response evaluation team
- It should be made clear to Respondents that only their Response will be discussed.
- A record of the debriefing meeting must be made by the Contract Manager and placed on the appropriate registered file. This record should not be sent to Respondents.

The following information should be conveyed:

- The Ausgrid business philosophy of obtaining the best value for money, that is, the highest evaluated Response, NOT the lowest price conforming Response; and
- Details as to the areas where the Response fell short in comparison with the successful Response.

The following information should **NOT** be conveyed:

- The commercial conditions of the successful Response;
- Any details of the successful Response marked "Commercially Sensitive"/"Commercial-In-Confidence";
- Any details of other unsuccessful Responses, other than the name of the Respondent
- Pricing and costs submitted by other Respondents.

Should a Freedom of Information application be received in respect of procurement matters, this should be referred to the relevant Business Unit Manager and the Freedom of Information Coordinator for advice and guidance.

5.6 Raise Purchase Order or Outline Agreement

A purchase order or an Outline Agreement (refer to section 6.4.2) is required to be raised and issued as soon as the contract is awarded for all procurement. Unless an Outline Agreement is used, the purchase order should be for the total order of the procurement. Splitting of orders to multiple purchase orders of lower amounts rather than one purchase order for the total value of the procurement is not permitted.

6 Manage Contract and Supplier

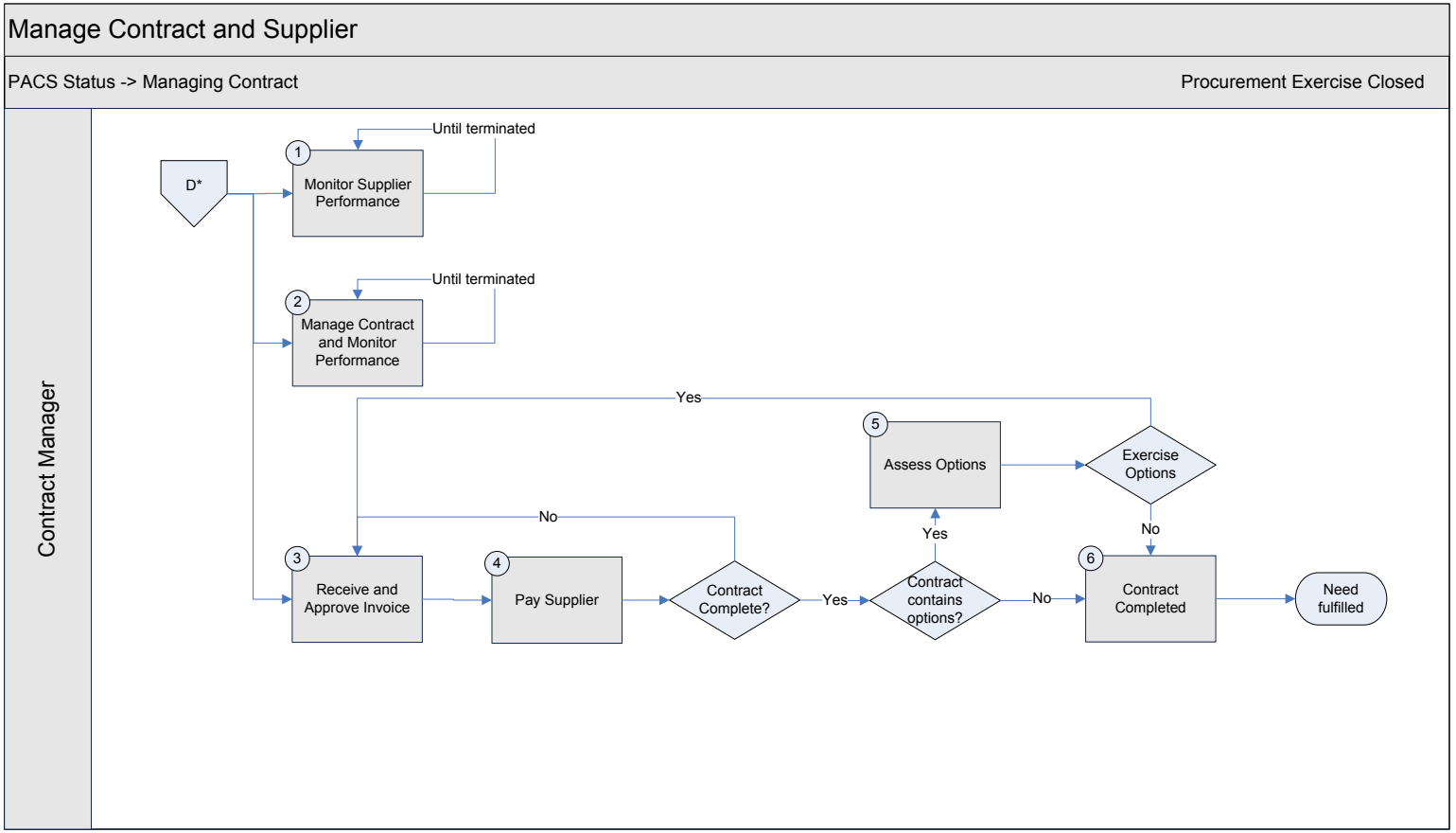
Introduction

The actions and outcomes for the Manage Contract and Supplier process and the supporting templates can be summarised as follows:

Step	**Manage Contract and Supplier**
Actions	• Monitor and manage performance of the supplier in accordance with Bid document performance measures/KPIs • Manage contract variations • Take receipt of goods or services procured • Make payment of goods or services obtained from the supplier • Assess and exercise options • Review actual against approved contract spend • Terminate the contract on completion
Outcomes	• Successful delivery of goods and services procured • Payments verified and made in a timely manner • Desirable options exercised • Contract variations managed
Templates	

A graphical depiction of the process can be found overleaf. A detailed description of each of the process steps can be found in the subsequent paragraphs of this chapter.

Process Overview



* Links from diagram: Award Contract

6.1 Monitor Supplier Performance

The ability to set supplier performance targets and monitor actual outturn during the course of the contract is a vital contributor to successful supplier relationships. Performance indicators and attainment targets should be detailed in the initial Bid document and built into the subsequent contract. These should be similar in nature to the Bid assessment criteria. The implications of under-or-over achievement against these targets need to be clearly spelled out within the contract in the form of appropriate sanctions or rewards.

Supplier Performance Measurement should be assessed annually or if necessary, earlier for standing offer agreements and prior to the executing an option to extend the contract. For "one off" Contracts, performance should be reviewed at the end of the Contract.

Supplier Performance Measurement techniques:

- provide an objective measure to ensure Ausgrid gets what it is paying for on time and within budget;
- assist with Supplier development and communication;
- catch any performance problems early;
- create and maintain central intelligence on Supplier performance for future use; or
- provide a benchmark from which to measure improvement.

Typical performance indicators could be:

- quality;
- timeliness of delivery;
- customer relations;
- responsiveness to change;
- competitiveness;
- technical knowledge (if applicable);
- professional knowledge; and
- innovation

An example of a supplier performance measurement matrix is given below:

Key Performance Indicator	Definition	Scoring
Delivery 35%	Have the goods / services been delivered on time?	1-5
	Has work been completed in full? Goods delivered in full?	1-5
	Are the goods / services delivered the correct items?	1-5
	Has the work been completed to acceptable quality standards?	1-5
	Have variations been kept to a minimum?	1-5
Compliance 20%	Have contractual terms and conditions been complied with? To what extent have defaults occurred?	1-5
	Has the Supplier adhered to relevant OH&S legislation?	1-5
	Has the Ausgrid environmental policy been complied with?	1-5
Cost 35%	Has the work been delivered with the lowest possible overall cost? I.e. have non-cost factors impacted on price?	1-5
	Did the Supplier meet or exceed its production lead times?	1-5
	Were the minimum order quantities in place reasonable?	1-5
	Did the Supplier adhere to the required specifications?	1-5
Relationship 10%	Did the Supplier seek to unreasonably claim payments under the Security of Payment Act? Liquidated damages?	1-5
	Has the company threatened or instigated industrial disputes or union involvement?	1-5
	Was the business relationship enhanced during the project?	1-5
	Was the Supplier's contribution to the project under the prescribed budget?	1-5
	Were innovative solutions provided that added value to the project and may add value to future projects?	1-5

Diagram: example supplier performance matrix

Supplier performance measurement should be a team activity, particularly seeking input from end users and stake holders. In some cases, it may be appropriate for the Contract Manager and Supplier to conduct the rating jointly. This encourages the Supplier's involvement in monitoring their own performance and reduces the chance of disputes when ratings are discussed. In other cases, it may be possible to make "self-monitoring" one of the Supplier's responsibilities under the Contract as long as independent verification by Ausgrid on a sample audit basis is possible.

Supplier performance measurement should be communicated and subcontract review meetings should be held with the Supplier to consider the results and agree action plans, where necessary, for improving performance.

The most successful contracts occur when both parties realise that they have a major role to play in the performance of the Contract. Assessing performance should be a two way process. Many customers think that their part is over when the contract is signed. Having a mechanism for suppliers to assess Ausgrid means that the company has a mechanism to improve purchasing performance and the Supplier should feel more comfortable about criticising its "source of income".

Formal records of supplier performance are essential supporting evidence should it prove necessary to take formal action to terminate the Contract.

6.2 Manage Contract and Monitor Performance

The Contract Manager acts as the steward of the supply arrangement through its life, with wide responsibility for variations, operational delivery and performance monitoring.

Contract Managers must have access to the specialist skills needed to properly manage the Contract, either through direct training or through seeking guidance from the Divisional Procurement Manager.

A well-defined contract management strategy will address issues such as:

- performance measures and performance monitoring
- inspection and testing
- payment
- disputes and unsatisfactory performance
- disengagement procedures
- communications with the supplier, the client and other stakeholders
- record management
- transition arrangements

It is important to remember that the contract documents will set parameters for these issues. The Contract Manager should consider the conditions of contract when developing contract management strategy.

In developing strategies for managing these issues the Contract Manager should consider factors such as:

- the value and importance of the procurement exercise
- the degree of risk
- the capabilities of the supplier
- the resource implications of the management strategy

6.2.1 Contract Variations

A Contract Variation is an agreed change to a term/s of the contract or its scope. As such it is important to review any proposed change within the context of the whole contract and access if the proposed change will impact other terms and conditions of the contract or introduce any new risks to the contractual relationship. This assessment should be carried out by the Contract Manager with the involvement of key stakeholders and specialists in the area of procurement and legal. Once the variation has been appropriately assessed and prepared for implementation, it must be approved by an appropriate Delegated Officer under Schedule C of the Delegations Policy prior to being implemented.

6.2.2 Increase to the value of the contract

In instances such as a Standing Offer Agreement where Ausgrid has the need to purchase more items from the contract than what was originally planned or noted in the Recommendation to Award Contract, the following endorsement process must be followed: .

Where the increase in requirement does not result in the value of the new Whole-of-Life contract value to exceed $20,000.	No endorsement required prior to approval.
Where the increase in requirement (or accumulated requirement) exceeds 10% of the whole of life contract value documented in the Recommendation to Award Contract and the new whole of life contract value exceed $100,000. **or**	Endorsement must be obtained from the Divisional Procurement Manager Panel prior to approval.
Where the increase in requirement (or accumulated requirement) exceeds 10% of the whole of life contract value documented in the Recommendation to Award Contract and the new whole of life contract value exceeds $2,000,000.	Endorsement must be obtained from the Procurement Review Panel prior to approval.
All other circumstances.	Endorsement shall be obtained from the relevant Divisional Procurement Manager prior to approval.

Note: Variations based on clear criteria agreed to in the original Contract (such latent conditions or price variations in accordance with a specific formula) do not require these endorsements prior to approval.

The Contract Manager shall ensure that Contract Variation submissions:

- justify a valid **reason** for variation under the contract; (relative to the original scope of the contract; and within the conditions governing the contract; e.g. time bars for notification of variation claims);
- include an assessment of the performance of the contractor;

- justify the reasonableness of the **value** of the variation; whether it be based on rates in the contract and accepted quantities, or some other relative costing mechanism such as cost plus margin, etc; and
- are prepared in sufficient time to allow for the required endorsements to be obtained.

Advice to the Contractor of acceptance or rejection of any Contract Variation shall be in writing and in accordance with the Conditions of Contract. If the advice is of a rejection of a variation claim, the reasons for the rejection shall be contained in such advice.

6.2.3 Contract Spend Review

The Contract Manager is responsible for ensuring that contract spend does not exceed the approved value.

The Contract Manager is required to conduct an annual spend review on all Standing Offer Agreements. The review should cover:

- Actual commitments against approved contract/agreement value;
- Forecast expenditure until contract expiry

Standing Offer Contract Review must be endorsed by the Divisional Procurement Managers or Procurement Review Panel (PRP).

Spend review for non Standing Offer Agreements must be conducted at the expiry of the Contract.

6.3 Advice to Receive and Approve Invoice

Goods must be checked for quantity and quality on delivery and the goods delivery note signed and dated. Any faulty goods shall be returned to suppliers using the supplier returns procedure.

Any services that are received will be authorised through the relevant department and the use of supplier timesheets, work completion documents or cost tracking reports.

All goods received by Ausgrid shall be immediately receipted against the appropriate SAP purchase order. All services received by Ausgrid shall be receipted as soon as the correctly rendered invoice is approved. Suppliers must be directed to include the Ausgrid SAP Purchase Order number on their invoice and to forward all invoices to Accounts payable for processing, approval and payment via the Vendor Invoice Management (VIM) system. Any manual invoices received should be forwarded to Accounts Payable to enable approval, processing and payment via the VIM system.

Invoices shall only be paid following appropriate approval.

6.4 Pay Supplier

6.4.1 Payment of creditors

Settlement of creditors' claims for payment arising from procurement Contracts, or orders placed, shall be in accordance with the terms of the contract. Care shall be taken to ensure that all discounts (including discounts for prompt payment) are not foregone.

If an invoice is received late as a result of being wrongly addressed, the Supplier should be notified immediately.

Supplier invoices received without a relevant order number will not be paid.

If any invoices have been disputed, the Supplier and Ausgrid's Accounts Payable staff should be notified immediately. The disputed amount on the invoice will not be paid until resolution.

Payment of suppliers will be made upon complete provision of goods and services (unless there is an express provision for stage payments). Suppliers must initially only submit draft progress claims. This assists in clarifying any issues prior to the finalisation of such a claim. All progress claims are to be sent to the project site. Once approved, invoices can be forwarded from the supplier to Ausgrid's Accounts Payable for payment.

It is Ausgrid's intention to pay on time and never late. Ausgrid standard payment terms for valid tax invoices are on a net monthly basis i.e. 30 days from month end after date of valid invoice. Earlier payments can be made to secure an appropriate settlement discount.

Without adherence to Ausgrid policy, staff risk putting the firm at a disadvantage by overpaying Suppliers, impacting cash flow, and negatively affecting project budgets in terms of both cost and time.

6.4.2 Managing payments under contract

For the purposes of allowing payments to be made against a Contract, and for expenditure control against the approved Contract budget, a SAP Purchase Order must be raised for each separate requirement under the Contract. For AG Contracts, i.e. any contract where more than one SAP Purchase Order will be raised during the period of the Contract, an Outline Agreement must be raised in the SAP Materials Management module. SAP Purchase Orders will then be raised against the Outline Agreement as required.

6.4.3 Approval for Increases to Purchase Orders Values

Where a SAP Purchase Order is raised in clause 6.4.2 above and where that order is required to be increased in value, approval from the original approval officer is required prior to the increase. If the new whole of life value exceeds the delegation of authority level of that officer, then approval from an officer with the appropriate level of delegation shall be obtained prior to the increase.

6.4.4 Approval of Invoices and Credit Notes

All supplier claims for payment and credit notes must be approved in accordance with Ausgrid's delegated authorities and VIM processes and procedures.

6.5 Assess Options

A Contract Option is a right to invoke a provision in the Contract (for example, an option to extend the period of the contract or an option to vary the delivery location). Changes not provided for in the Contract are Variations.

Where an option is provided for in the Contract, that option may be executed with the approval of an appropriate Delegated Officer under Schedule C of the Delegations Policy.

6.6 Contract Completed

Upon completion of a Contract for the supply of stores or the carrying out of works and/or services, security may be released **only** when it has been established that the Contractor has complied with all conditions of the contract, including, without exclusion to other rights and remedies of Ausgrid, the contractor's obligations against defects liability and warranties. The release of security deposits should not be unduly delayed.

Should a Contract be terminated for any reason and it is proposed to release the security, approval for the release of such security can only be given by the General Manager - Finance and Compliance.

Should it be decided that a security shall not be released; arrangements shall be made for the amount of the security to be dealt with in a manner determined by the General Manager - Finance and Compliance.

The GST impact of claiming a security (Ausgrid will have to pay GST on the amount claimed) must be added to the sum for the purposes of assessing the claim amount.

7 Disposals

7.1 Method of sale

Obsolete or surplus stores, goods, materials and equipment shall be disposed of either by auction sale, private treaty, Tender or Quotation. Where it is considered appropriate to use other means, the concurrence of the Procurement Review Panel (PRP) should be obtained.

Tenders shall be invited when the estimated sale value of the stores or plant is $200,000 or more, except when sale by public auction. Tenders shall be opened and dealt with in accordance with normal Tender procedures with the aim of obtaining optimum value for money for Ausgrid.

Items not exceeding $100 in value may be sold at a fixed price. Prices shall be consistent with the market value of the item, as approved by the Divisional Procurement Manager.

7.2 Acceptance of tender or quotation

Acceptance of Tenders may be authorised by officers with the appropriate authority under Delegations Policy Schedule D and subject to the concurrence of the Procurement Review Panel (PRP) where the estimated value of the disposal items exceeds $200,000.

Where the recommended Responder is an officer of the Corporation or the spouse or dependant of an officer of the Corporation the General Manager of that Division must approve. Where the recommended Responder is an officer of the Corporation or the spouse or dependant of an officer of the Corporation at or above the level of General Manager the next level Delegated Authority must approve.

A monthly return of all sales shall be prepared by the officer initiating the disposal.

7.3 Declaring goods obsolete or surplus

The disposal of scrap, surplus or obsolete materials or equipment is the responsibility of the line manager to initiate in the first instance.

Where surplus stores or equipment are held by a Division or Subsidiary, and are considered by the line manager to be of potential value to other Sections or Business Units of the Corporation or its Subsidiaries, the items should be returned to stores or offered to other Units of the Corporation by Circulated Advice.

In the case of stores disposed of which are not in Store, a Return to Store Docket shall be made out by the Business Unit concerned.

8 Schedule 1: Approvals

All procurement activities must be approved by the delegated officer. Procurement Plan delegated authorities are listed below, all other approvals may be found in the Ausgrid Delegations Schedule on the Wire.

Sub-delegation type	CEO	COO	Chief Engineer	L4a [1]	L4b [1]	GM NW Ops	L4 [2]	GM NW Dev	L4 [3]	L5 [3]	GM HSE	L4 [4]	GM F&C	L4 [5]	L5 [5]	GM ICT [6]	GM P&S	L4a [7]	L4b [7]	L5a [7]
Procurement - Goods & Services																				
Approve a Procurement Plan In accordance with Procurement Policy & Procurement Process Manual	Unlimited	$10M	$2M	$1M	$500k	$2M	$250k	$5M	$2M	$500k	$2M	$250k	$2M	$500k	$100k	$2M	$2M	$1M	$500k	$500k
Approve a Recommendation to Award	Refer to Delegations Schedule - 1.1.1 & 1.1.3																			
Place a purchase order	Refer to Delegations Schedule - 1.1.1 & 1.1.3																			
Approve a Recommendation to Vary	Refer to Delegations Schedule - 1.1.1, 1.1.3 & 3.3.8																			
Execute a Contract	Refer to Delegations Schedule - 3.3.8																			

[1] Chief Engineer
Level 4 Managers reporting to Chief Engineer as follows:
4a: M-A&NP, EM-DS, GM-D&E
4b: All other Level 4s

[2] GM Network Operations
Applies to all Level 4s reporting to GM

[3] GM Network Development
Applies to all Level 4s reporting to GM, all Level 5s reporting to L4

[4] GM Health Safety & Environment
Applies to all Level 4s reporting to GM

[5] GM Finance & Compliance
Applies to all Level 4s reporting to GM

[6] GM Information, Communications and Technology
Delegation applies only to GM ICT

[7] GM People and Services
4a: Mgr P&L, Mgr Property & Fleet
4b: All other Level 4s
5a: Level 5 Property Managers & Level 5 P&L Managers
5b: All other Level 5s

Transport
Roads & Maritime
Services

CE14/2011

Mr Vince Graham
Chief Executive Officer
Networks NSW
PO Box 811
Seven Hills NSW 1730

RECEIVED
13 JAN 2015

Dear Mr ~~Graham~~ Vince

The Network NSW Black Spot Pole Program, across the three businesses of Endeavour Energy, Ausgrid and Essential Energy, continues to be an important component of Roads and Maritime's Road Safety strategy.

The Program improves road safety by investing in infrastructure to reduce the impact of vehicle incidents involving power poles. Since the inception of the Endeavour Energy program, fatalities resulting from vehicle collisions involving power poles in the Endeavour Energy franchise area have decreased by more than 60%.

I understand the Black Spot Pole Program is at risk of being reduced or discontinued as a result of the Australian Energy Regulator's draft determinations on the annual revenue requirement for the regulated businesses, issued in November 2014.

Roads and Maritime supports the continuation of investment in the Black Spot Pole Program, with its objectives of improving driver safety and reducing the impacts associated with vehicle and power poles.

Networks NSW is a key partner for Roads and Maritime, particularly relating to power poles. I look forward to continuing to work with the Network NSW businesses on improving road safety. For more information, please contact Mr Steven Head, Network General Manager Sydney on (02) 8588 5610, who would be happy to take your call.

Yours sincerely

6.1.2015.

Peter Duncan
Chief Executive

DRAFT NOTES:
MEETING BETWEEN EPA AND ENERGYAUSTRALIA
Tuesday 29 October 2002 at 2pm
Level 7, 79 George St Parramatta

ATTENDEES

Ross Carter - Executive Director Sydney Region (EPA)
David Featherston - A/Manager Sydney Local Government (EPA)
Susy Cenedese - A/Senior Regional Operations Officer (EPA)
John Eisenhuth (EA)
Trevor Armstrong (EA)
James Hart (EA)

GENERAL OBSERVATIONS

- EPA was generally happy with EA's progress over recent years and EA's current approach to managing key issues through management strategies in consultation with the EPA.
- EPA expects that EA will match it's environmental intentions with on the ground performance.

KEY EPA COMMENTS AND EA ACTIONS

ISSUE 1 – Oil Filled Cables.

- RC believed EA's oil cable strategy was, in general, well scoped out.
- RC advised EPA's current philosophy is to set desired outcomes allowing businesses to find solutions that suit their circumstances.
- SC would like to see specific actions and associated contributions to the 5% target.
- RC would like to see the target revised in 12 months to a level which can be demonstrated as reasonable.
- RC advised that biodegradable oil is a question of degree and in any case, only produced marginal benefits. The largest component of environmental harm in these instances is often acute.
- RC may be interested in talking to Mr Bradley (specialist coming from the UK) to discuss comparisons between EA's and the UK's UG transmission systems.

ACTIONS:
- JH – Incorporate EPA comments into draft strategy - **by 1 December 2002.**
- JH – Arrange meeting between EPA and Mr Bradley to discuss comparisons between EA's and the UK's UG transmission systems – **by 1 July 2003.**

ISSUE 2 – Oil Containment

- RC advised that the consequence of an oil spill and hence the sensitivity of the receiving environment should be a key aspect of any risk assessment.
- RC advised that $0.5M separators may not be the best solution for all situations. Rather, solutions and resources should be allocated according to their contribution to reducing the risk.
- RC advised that the EPA are obliged to investigate any major failure. However, any decision to prosecute would depend on the circumstances. In particular, EA should have properly identified it's risks, adequately allocated resources to those risks and effectively responded to the incident.
- RC advised that EA's proposed approaches to oil filled cables and oil containment is in line with EPA's preferred approach of identifying risks and allocating resources.
- RC advised that the EPA cannot approve a particular discharge concentration of oil in water, but rather any target should be based on EA's risk assessment and best management practice.
- RC advised that EPA appreciates that long term solutions are required for this issue, and that retro-fitting old technology (eg single stage separator) to achieve current best practice (and only a marginal benefit) may not be the best allocation of resources.
- SC advised that EPA would like to see International Best Practice and stormwater inflow information incorporated into the strategy.
- RC advised that minimising the catchment size can be one of the most effective ways of minimising costs and associated complications.

ACTIONS:
- JH – Incorporate EPA comments into draft strategy – **by 1 December 2002**.
- JH – Submit draft strategy to TA - **by 15 November 2002.**
- TA – Submit draft strategy to Executive allowing 3 weeks for comment.
- JH – Resubmit draft strategy to TA.
- TA – Resubmit draft strategy to Executive.
- JH – Submit draft strategy to EPA - **by 1 January 2003.**

ISSUE 3 – Responsibility for Contractors.

- RC advised that EA is ultimately responsible for the actions of it's contractors.
- RC advised that EPA will always examine EA's contribution to incidents involving an EA contractor.
- RC advised that EA must ensure it has a robust system with strong feedback loops that can be proved as such by it's performance on the ground.

ACTIONS:
- JH – Report to M-P&C on the implementation of actions that EA has recently communicated to the EPA – **by 1 February 2003.**

Environmental Management Strategy
Underground Transmission Cables

EMS 300

Version 11.3, 27 August 2014

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Glossary

24/7	24 hours, 7 days a week
AER	Australian Energy Regulator
ANZECC	Australian and New Zealand Environment Conservation Council
CLM Act	Contaminated Land Management Act 1997
DBYD	Dial Before You Dig
DG	Ausgrid's distribution guideline
Emergency works	Works for the purpose of maintaining or restoring infrastructure facilities or equipment in order to ensure public safety or to protect buildings or the environment due to: • a sudden natural event, including a storm, flood, tree fall, bush fire, land slip or coastal inundation, or • accident, equipment failure or structural collapse, or • damage caused by vandalism or arson, provided the works involve no greater disturbance to soil or vegetation than necessary and are carried out in accordance with all applicable requirements of the Blue Book.
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services.
EPA	Environmental Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulations	Environmental Planning and Assessment Regulation 2000
Km	Kilometre
KPA	kilopascals
kV	kilovolts
LAB	Linear Alkylbenzene
OCP	Organochlorine pesticides
OEH	Office of Environment and Heritage
OH&S	occupational health and safety
POEO Act	*Protection of the Environment Operations Act 1997*
RMS	Roads and Maritime Services
SCFF Cable	Self contained fluid filled cable
XLPE	Crosslinked polyethylene

Executive summary

Ausgrid is committed to the community, safety and meeting the needs of a growing energy market by effectively maintaining our assets, (in accordance with the AER submission) and finding better ways to plan for our future energy demands.

Ausgrid has approximately 420kms of cables which are paper insulated fluid filled, also known as self contained fluid filled (SCFF) cables. This represents approximately 4% of Ausgrid's underground network. The function of the cable fluid is to improve performance of the cable by filling voids present in the paper insulation and so avoiding cable breakdown. The cables were installed mainly in the 1950s through to 1970s.

As these cables are buried in the ground they are subject to environmental and mechanical stresses as well as the electrical stresses they experience through normal operation as part of the electricity network. Where these stresses result in damage of the metal sheath containing the insulating fluid it is possible that this fluid can leak into the ground, either from continuous small leaks or infrequent catastrophic leaks, which requires prompt excavation and repair.

The fluid filled cables are in continuous use and are an essential part of Ausgrid's supply network, and therefore cannot routinely be taken out of service except for brief periods necessitated by the need for maintenance and repair.

Minimising the environmental risk associated with the operation, maintenance and repair of fluid filled cables is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures including cable maintenance, repair, reporting, replacement and other improvement projects outlined in this strategy.

Key measures include:

- Use of biodegradable linear alkylbenzene as the replacement fluid for the cables.
- A commitment to use non fluid filled (Cross Link Ply-Ethylene (XLPE)) cables for all new feeders.
- A range of strategies to prevent unauthorised excavation such as Dial Before You Dig, patrols, handouts and seminars.
- Maintenance, monitoring, resourcing and training procedures.
- Internal and external reporting procedures commencing when leak rates reach locatable levels (currently 5L/day).
- A commitment to continue to target fluid losses 30% below the 2009 (which was a 15% reduction on the 2001 level) target.
- A commitment to adopt proven technologies that will improve performance as soon as possible.
- Ausgrid is currently planning for the replacement of fluid filled cables by 2030 (target date, subject to AER approval of appropriate levels of capital funding).
- A commitment to report against, review and update this plan on an annual basis.

1 Scope

This management strategy outlines the management of environmental issues associated with Ausgrid's fluid filled underground transmission cables and associated trenches. It also considers the health, safety and environmental controls applicable during the excavation, restoration, works, storage, transport and disposal of soil and water from these trenches.

The management plan is not an Asset Management Plan for Sub-transmission Underground cables.

2 Background

Throughout its distribution area, Ausgrid has an extensive network of approximately 11,000km of underground cables. Of the 11,000km only 420 route km are paper insulated with continuous fluid irrigation and are subject to this management plan. The 420km of fluid filled underground cable network is made up of roughly 85 feeders that contain around 4,000 joints and approximately two million litres of fluid. This consists of fluid in the cables, the pressure tanks, sealing ends and joints distributed across Sydney and Newcastle. The fluid filled cable network operated by Ausgrid consists primarily of 132kV cables with smaller lengths of three core 33kV, and very short lengths of 66kV.

The majority of these feeders are ex Electricity Commission assets transferred to Ausgrid in the 1990's. The cables form an integral part of the electricity transmission network.

Fluid-filled cables are typical of the technology used worldwide at the time, but is now considered an obsolete technology for cables operating at these voltages. **Table 2-1** provides an overview of the network.

Table 2-1 Underground Fluid Filled Cable Network

Voltage (kV)	Installation date	Locations	Comments
33	1945 – 1952	Inner Sydney (Darling Harbour Area)	33kV fluid cable now retired in the Sydney area
33	~ 1965	Newcastle area	Approximately 38km installed Approximately 25km remaining
66		Hunters Hill Carlingford	Retired in the Hunters Hill area 75 – 150m long and wholly within Carlingford STS
132	1963 - 1980	Throughout the Sydney Region	Approximately 455 circuit km fluid filled installed Approximately 392km remaining

As most of these cables are buried in the ground they are subject to environmental and mechanical stresses. Where these stresses result in damage of the metal sheath containing the insulating fluid it is possible that this fluid can leak into the ground, either from continuous small fluid leaks or infrequent catastrophic fluid leaks (often a result of 3rd party dig in), which requires prompt excavation and repair. They are in continuous use and are an essential part of Ausgrid's supply network, and therefore cannot routinely be taken out of service except for brief periods necessitated by the need for maintenance and repair. Details on cable design and installation are shown in **Appendix A**.

3 Issues

3.1 Cable Fluid

The fluid in underground cables is an essential part of the cable design. Its function is to improve performance of the cable by filling voids present in the paper insulation and so avoid cable breakdown. The fluid must be maintained at a positive pressure to inhibit the entry of air and moisture into the cable to prevent electrical failure occurring.

When laid, the cables contained a highly refined mineral oil. Cables were supplied from the manufacturer with the oil already filled into the cable and as the cable is a closed system no additional oil is required once the cable is installed. Therefore any cables which have not suffered damage, and not required repairs, will still contain mineral oil. Additional fluid is only added to the cable section if a leak occurs to maintain pressure and to prevent damage to the cable.

Since the early 1990s, mineral oil has been replaced by a blend of linear alkylbenzenes as the replacement fluid used in the cables. This fluid has better electrical characteristics, is readily biodegradable, and therefore more environmentally responsible.

See **Appendix B** for technical details on Linear Alkylbenzene Fluids.

3.1.1 Fluid Leaks

Leaks in underground cables are sometimes unavoidable. In Ausgrid's experience, and indeed around the world, the majority of leaks occur at joints and/or tanks rather than in the cable itself. This is because the transition from joint to cable is the weakest part of the system and therefore these points require less strain for a break or failure to occur. Most cable leaks are a result of determination of the cable or cable components however 3rd party damage accounts for most of the cable fluid losses

Causes of leaks include:

- damage by third parties,
- ground movement,
- the effects of traffic;
- termite damage;
- design problems (eg inappropriate sheath alloys);
- environmental influences (eg contaminated groundwater at Banksmeadow causing damage; to the PVC serving requiring work to replace this section of cable); and
- fatigue.

Further detail about typical failure modes, causes and follow-up action are outlined in **Table 3-1**.

Table 3-1 Failure Modes, Causes and Action

Failure mode	Cause	Action required
Wipe/plumb failure at joints.	Cable aluminium sheath is sealed to the joint copper shell using a wiped solder joint - this can crack and leak due to causes such as ground movement or poor workmanship.	Leaks are repaired by re-wiping, usually the adjacent joints will also be re-wiped at the same time if possible to prevent further leaks. Joint refurbishment (targeted rewiping based on risk factors before leaks are encountered) is being adopted on some cables where appropriate.

Failure mode	Cause	Action required
Fluid line/connection leaks.	Fluid lines are connected to stop/feed joints to supply fluid to the cable, these lines can leak due to corrosion, cracked connections etc.	Fluid lines are replaced with modern pipework, this is sometimes done on a complete circuit where recurring problems / common causes are encountered.
Cable sheath cracking.	Some transmission cables have a lead sheath, this can crack and leak due to corrosion, fatigue, reinforcement failure, ageing etc.	Cable sheath leaks are difficult to locate, involving multiple excavations to pinpoint the precise source of the leak. While the immediate leak can be stopped using a sleeve repair, deteriorated lead sheaths are vulnerable to further leaks due to the need to move the cables during repair works, and generally it will become necessary to replace long lengths or entire cables.
Termite damage	Termites can eat through a cable's outer PVC serving to leave the underlying aluminium sheath exposed to pinhole corrosion and fluid leaks.	A sleeve repair is used to stop the immediate leak, and the cable will be electrically-tested to detect whether serving damage is present elsewhere - this damage can then be repaired before further leaks occur. Termite-proof mesh was trialled in 2003 on cables in Moore Park golf course - this has been successful, with no further leaks to date. It would be impractical to use termite-proof mesh on most cables that are buried under roads - these should be periodically serving-tested to detect/repair damage before leaks occur, or it may become necessary to replace long lengths or entire cables.

Pressure due to the physical cable profile (the steepness of the ground that the cable traverses) is not believed to be a primary cause of fluid leaks. The cables are rated to 700 KPA and few cable pressures exceed 200 KPA. Historically few fluid leaks have occurred at the bottom of steep inclines.

When a leak occurs it is necessary to pump fluid into the cable to maintain the insulation in the cable. Thus in a leak situation, if the cable section has not had a leak before, the first fluid that leaks will most likely be mineral oil from the hollow duct in the centre of the cable. This will then be followed by the linear alkylbenzene fluid which is pumped into the cable to maintain operating parameters.

A cable has approximately 1 litre of fluid per metre of cable. Much of this fluid is impregnated into the paper insulation and is therefore bound up in the cable. It is only the fluid in the hollow duct (approximately 1/3 of the fluid in the cable) which readily escapes in the event of a leak.

Leak rates below 5 litres/day cannot be practically located with current leak location techniques.

Analysis of leaks between 1999 and 2002 has revealed that the system was losing approximately 34kL per year of fluid at a rate of 67L/km/year. The majority of leaks, 52.5%, were less than 1L/day, which is well below the rate of 5L/day at which the leaks can be located and another 16% leaked at a rate of 1-5L/day, still below the threshold level.

Since 2001 Ausgrid has achieved significant reductions in its cable fluid loses through proactive initiatives such as the implementation of this management strategy. The strategy set an initial leak reduction target for 2009 of 15% on the 2001 cable fluid losses (The 2001 rolling average leak rate was roughly 2,830L/month. The 2009 15% reduction was roughly 2,795L/month).

The 2009 target was achieved and a subsequent target has been set for 2014 of 30% below the 2009 target. This target is to achieve a monthly rolling average of 1,956L/month.

3.2 Pesticides

3.2.1 Historical Application of Pesticides (OCPs)

Termites can cause damage to the cable serving, which then exposes the sheath. Subsequent corrosion of the sheath can result in an fluid leak.

During installation between 1963 and 1980 the soil in some cable trenches was typically treated with organochlorine pesticides (specifically aldrin and dieldrin) to prevent the cables from being attacked by termites. No organochlorine pesticides (OCPs) were applied in cables installed after 1980.

Ausgrid cables are laid in trenches that are approximately 0.8 m wide and 1.1 m to 1.6 m deep. A concrete slab is placed above the cables. Pesticides were only applied to soils below the slab.

Termite resistant cables are now used and pesticides are no longer used in underground cable installations. See **Appendix E** for details on termite protection.

3.2.2 Concentrations of OCPs in cable trenches

In a 1997 study, undertaken by independent consultants Dames and Moore were commissioned by Ausgrid to conduct an environmental assessment of the 132kV fluid filled cable trenches to determine whether there was significant human health and environmental risk posed by any contamination associated with the pesticides in the trenches and to recommend a course of action.

The level of contamination of OCPs in soil from 132kV cable trenches within the Sydney area was determined from a statistical analysis of 20 sampling sites as part of the 1997 study, at predetermined locations, with five samples taken from various locations at each site.

Based on this investigation the concentration of dieldrin in soils directly above the slab has a 95% upper confidence limit (UCL) of 0.3 mg/kg. Given the method, by which pesticides have been applied to the trenches and the low potential movement of pesticides in the soils, it is unlikely that pesticide concentrations in surface soils exceed ANZECC B or Dutch guidelines or constitute a Scheduled Chemical Waste.

Concentrations of aldrin and dieldrin in soils below the slab have 95% upper confidence limits of 20 mg/kg and 2.8 mg/kg respectively. Therefore, soils below the slab (unless otherwise tested) are likely to be a Scheduled Chemical Waste.

The Dames and Moore study confirmed that only very low concentrations of OCPs were found above the concrete slab.

Dames and Moore's investigations revealed that:

- pesticides were only applied to soils below the slab;
- concentrations of aldrin and dieldrin (where detected) in the soils directly overlying the slab were significantly less than that detected below the slab;
- the upward movement of aldrin and dieldrin, is considered unlikely, and would be further restricted by the concrete or polymeric slab;
- aldrin and dieldrin adsorb strongly to soils, particularly where clay minerals and organic matter is present;
- aldrin and dieldrin have low mobility in soil, and only penetrate soil layers adjacent to the treated layer to a very small extent;
- aldrin and dieldrin are not easily leached, even in sandy soils with low organic matter content, and occurrence of either in groundwater is rare due to the extreme resistance to leaching; and
- the possibility of fluid in cable trenches is not considered likely to increase the mobility of pesticides.

In 2006, a further study was conducted by independent consultants Environ Australia (Environ) to provide an opinion on whether the conclusions and recommendations of the 1997 report are still valid. They found that the "conclusions of the 1997 study are considered to still essentially apply".

In 2010, a further study was completed by Coffey Environments to assess current legislative requirements and advise on environmental and OH&S requirements. The report found that "…the 95% UCL for aldrin and dieldrin, calculated by Dames & Moore (20mg/kg and 2.8mg/kg respectively) is still likely to be representative of conditions across the network."

The sampling undertaken as part of the 2010 Coffey Environments report supported previous results provided by Dames and Moore.

3.2.3 OCPs - Summary of Conclusions

The concentrations of pesticides and cable fluid in the soils below the slab and adjacent to the cables are such that, when combined with the controls in place and the above knowledge gained from independent investigations, will effectively manage the risks to workers, the public and the environment.

Aldrin and dieldrin are highly stable, bind strongly to soil and do not leach into ground water. Furthermore, dieldrin has a long half-life and period of activity. Those properties, combined with the concentrations determined by the investigation by Dames and Moore, indicate that the undisturbed cables that were treated with aldrin and dieldrin are still adequately protected against termites.

The Environ review concluded that there is a very low likelihood of exposure of the general public to these pesticides, even though the cable trenches pass under publicly accessible areas. The average concentrations were equivalent to the health investigation level for parks. Accidental exposure to the very low concentrations of pesticides above the slab were considered to be a slightly higher risk, however, "there appears to be a very high safety margin".

The Coffey Environments review concluded that "If the cable trenches are left in-situ and undisturbed, the risk to human health and the environment is considered to be low". "The main potential exposure is during cable maintenance activities when the material may be disturbed (ie during cable maintenance operations)". The report found that the exposure path could be effectively managed with suitable controls as detailed in this plan.

4 Environment

4.1 Land Contamination

Soils in cable trenches may be either contaminated with OCP pesticides or cable fluid. The concentrations of both are primarily confined to the soils below the slab. Aldrin and dieldrin adsorb strongly to soils, hence they are likely to be confined to the soils below the slab in the cable trench with "low mobility under most conditions" (Environ 2006 p6).

The Environ review undertakes a broad assessment of whether the cable trenches represent a Significant Risk of Harm (see Environ 2006 p6). The cables trenches are not considered to be a significant risk of harm as the pesticides are not water soluble, bind strongly to soils, are confined primarily to the soil below the slab, and have very limited exposure to the general public.

This is further confirmed in the Coffey Environments review "With regard to pesticide residues, in normal circumstances (i.e those consistent with the Dames & Moore (1997) sampling) there is unlikely to be a duty to report under s60 of the CLM Act…".

The migration potential of these OCPs are higher in organic solvents, and therefore may increase where there are cable fluid leaks. Major fluid leaks are investigated by Ausgrid's Environmental Services as part of the incident investigation process, so these situations are assessed as they arise, typically as part of the cable repair process.

Waste disposal of contaminated soils is heavily regulated. The excavated waste soils and water are carefully managed in accordance with Ausgrid's waste guidelines (see **section 4.3**). Where possible, soils are reinstated onsite in their original configuration of soils below the slab and soils above the slab remaining in their profile and reused so as to continue to provide termite protection. Alternatively they are removed from site as waste and tested to determine their waste classification for appropriate disposal and/or treatment.

The Coffey Environments review considers that where excavation or other disturbance of potential pesticide contaminated soils is carried out in accordance with an EMP, there would be low potential for land and/ or water pollution to occur, as defined in the POEO Act (1997).

4.2 Possible Migration to Water Bodies

Pesticides and cable fluid could enter a water body in sediment. Several scenarios are possible where this could occur;

- Excavation of soils and failure of appropriate management, for example by inappropriate stockpiling of excavated soils or failure of containment in rain conditions;
- With liquids, either accumulated in the trench or used for dust suppression;
- Failure by other factors, such as ongoing erosion or catastrophic erosion caused by storm, flooding, earthquake; or
- Submarine cables.

These scenarios are controlled by appropriate management and inspection procedures, typically as part of the incident investigation process including inspection of water bodies.

As aldrin and dieldrin are not water soluble and readily adsorbed to soil particles, pore water migration in soil is not likely to be the preferential pathway for these compounds.

As the solubility increases in organic material, it is possible that migration could occur in the event of an fluid leak. While the fluid itself would not be particularly mobile either, some migration could be possible in the event of long term or major leaks combined with unfavourable subsurface conditions, eg. permeable sandy soils and proximity to a receptor water body. In most cases, the fluid and any dissolved pesticides would be more likely to absorb to clayey soils on the trench walls and not migrate beyond the trench. In the Dames and Moore 1997 study, samples were obtained from one trench where a fluid leak occurred. Fluid was found to not have migrated far from the cables in high concentrations. In this case, pesticide concentrations were low.

4.3 Waste Management

Soils in the cable trenches may be contaminated with pesticides and cable fluid. Waste containing the pesticides may be subject to strict controls necessitating licences and approvals for storage, transport and disposal.

Ausgrid's EG 120 Waste Guidelines details the waste requirements relating to soil and water from cable trenches as follows.

4.3.1 Additional requirements for soil or material from 132 kV cable trenches

The soil surrounding Ausgrid's 132kV underground cables installed prior to 1980 may be contaminated with cable fluid and Organochlorine Pesticides (OCP). Typical waste classifications for this soil shown in **Table 4-1** below.

Table 4-1 Typical waste classification of soil from 132kV trenches

	EPA Waste Classification Guidelines	Environmentally Hazardous Chemicals Act 1985
Soil from above the slab - typically OCP<0.3mg/kg	General solid waste [A]	n/a
Soil from below the slab - typically OCP<20mg/kg	General solid waste [A]	Scheduled chemical waste [B]
Water from the trench – typically OCP<20mg/kg	Liquid waste [A]	Scheduled chemical waste [B]

[A] This cannot be relied on if the soil or water is suspected of being contaminated with cable fluid or any other substance. Testing should be carried out to determine the waste classification.

[B] Scheduled Chemical Waste has a concentration of Total Scheduled Chemicals > 2mg/kg.

Waste containing these pesticides may be subject to strict controls necessitating licences and approvals for storage, transport and disposal. The minimum controls are detailed in Network Standard *NS156 Working near or around underground cables* which is available to all people working on or near Ausgrid's underground cables. In summary the controls include:

WH&S Controls

The following minimum safety requirements must be implemented for the management of OCPs in Ausgrid's 132kV fluid filled cable trenches:

- Wear protective clothing. Clothing must provide coverage of arms and legs (i.e. overalls or long sleeved shirts and long trousers). Normal laundering is considered suitable for decontamination purposes.
- Wear safety footwear. In wet conditions gumboots are recommended. Bulk accumulated soil (such as mud or soil build up) should be removed from footwear before leaving the site.
- Wear gloves. Leather gloves are considered suitable, however, PVC coated gloves are preferred. Gloves should be disposed after use (Gloves are not required where their use is impractical provided the work area is clear of excess soil from below the protective slab and any adjacent cables are covered. Hands should be washed after working without gloves).
- Apply good industrial hygiene practices. No smoking, eating or drinking whilst working in contaminated areas and wash hands and face prior to smoking, eating or drinking.
- Use eye protection. Wear safety glasses or safety goggles where excessive dust is generated. The use of dust masks should be assessed and if considered prudent they should be used. Dust control measures must be applied.

Note: An Occupational Hygienists can provide more specific advice regarding the handling of OCPs.

Note: These matters must be included in any site specific hazard assessments prior to the commencement of works.

Managing Water

Where the presence of OCPs has been identified or has not been ruled out, accumulated water from Ausgrid's 132kV fluid filled cable trenches may contain OCPs. The following minimum controls must be applied:

- Minimise the volume of contaminated water generated. Where possible, minimise rainwater or 'run-on' water entering trenches e.g. cover trenches and divert water around trenches.

- Do not allow uncontrolled water to leave the site. Accumulated water from the trench must not be released to any waterway or discharged onsite. Accumulated water must be collected and managed in accordance with *Waste Management* below.
- Do not allow uncontrolled soil to leave the site. Prevent soil or any contaminants entering any waterway e.g. use sediment control devices.

Note: Handle and dispose of used sediment control devices as OCP contaminated. See Section 9 Waste Management below.

Handling Soil

Where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied when soil is being handled:

- Prevent dust generation, especially from stockpiled soil.
- Keep soil from below the protective slab separate from soil from above the protective slab. Manage soil from below the protective slab in accordance with *Storing Soil* below. Soil from above the protective slab has no special handling requirements with respect to OCPs.

Storing Soil

Where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied when soil is being stored:

Note: These requirements can be satisfied by using a waste facility licensed to store Scheduled Chemical Waste.

- Soil excavated from Ausgrid's 132kV fluid filled cable trenches must be contained in a plastic lined and covered secure bin to prevent water ingress or dust escape.
- Any person handling the waste is trained in handling Scheduled Chemicals and methods of containing Scheduled Chemical spills, and wears personal protective equipment.
- All packages / storage containers are clearly labelled and maintained in good order.
- Where more than 50kg but less than 1 tonne is stored, ensure that:
  - There is a clearly defined storage area with conspicuous warning notices identifying the area.
  - The storage area is constructed to prevent discharge into the external environment. For soil this can be satisfied by storing in a lined and covered bin.
  - An adequate supply of personal protective equipment, clean-up material and equipment is available in a secure location external to the storage area.
- Where 1 tonne or more is stored you will also require and need to comply with the conditions of a licence under the Environmentally Hazardous Chemicals Act 1985.

Reinstatement

When reinstating trenches where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied:

- Where possible soils should be reinstated and not disposed of off-site.
- If soil is not contaminated with cable fluid (or anything other than OCP) it can be replaced in the trench to original depths. Soil excavated from below the protective slab must be reinstated below the protective slab. This reduces potential exposure pathways as contaminated soils are not at the surface and provides continued termite protection for the cables.
- Where soil contains contaminants such as cable fluid, etc., the fill material should be disposed off site to a suitably licensed waste facility, refer to *Waste Management* below.

Waste Management

There are two options for the management of spoil from Ausgrid's 132kV fluid filled cable trenches:

1. Where possible soils should be reinstated to the original depth and not disposed of off-site.
2. Where spoil and liquid waste is required to be disposed off-site the waste must be classified in accordance with the NSW DECC's Waste Classification Guidelines. This sampling must include OCPs.

Note: When working below the protective slabs, sediment control devices from the work site and liquid waste (i.e. water) from the trench should be managed the same as spoil from below the protective slabs.

When transporting spoil where the concentration of Aldrin or Dieldrin in the soil is 50mg/kg or greater, or the presence has not been ruled out, the following additional controls apply:

- The transport vehicle must carry personnel trained in containing spills of OCP contaminated spoil.
- Appropriate PPE, clean up material and equipment must be carried on the transport vehicle.

4.4 Environmental Guidelines

In addition to this document, Ausgrid guidelines that are relevant to the environmental management of fluid filled cables include:

- EG 001 Environmental incident response
- EG 100 Oil handling and spill response
- EG 120 Waste Guidelines
- EGN 101 Oil spill containment and clean up guide
- NS156 Working near or around underground cables
- NUS 174c Environmental Handbook

5 Health and Safety

5.1 Exposure Scenarios

5.1.1 Public

The following is an extract from the Environ review.

" The cable trenches pass under publicly accessible areas such as golf courses and parkland. Although the average concentration of aldrin plus dieldrin is equivalent to the health investigation level for parks, there is no exposure pathway and therefore no risk to the general public. Accidental exposure is not possible because of the presence of a concrete slab above the cables, irrelevant to the concentration of pesticides.

There is some risk of accidental exposure to the low concentrations of pesticides found above the concrete slab, for example by landscaping activities. The maximum concentration detected above the slab was less than 1 mg/kg. This is well below the long term residential guideline of 10mg/kg that is calculated on the basis of exposure over 70 years. There appears to be a very high safety margin.

Exposure risk could occur by failure of appropriate management of excavated soil, for example, if excavated soil was spread onto adjoining areas."

5.1.2 Maintenance workers

The following is an extract from the Environ review.

"Maintenance workers would be exposed to pesticides when trenching to conduct repairs. A preliminary assessment based on the average soil concentration of 20mg/kg for aldrin and 3 mg/kg for dieldrin indicated that the reported soil concentrations do not exceed the NEPM HIL-F value of 50 mg/kg, which is based on long term exposure. A calculation for maintenance workers using a risk assessment process (enHealth 2004) based on conservative assumptions (see attached) also indicates no intolerable risks (ie. hazard index <1) . While higher concentrations of pesticides could occur, it is reasonable to consider that workers could be exposed to the average concentration over the 30 years assumed in the calculation.

The calculations make assumptions that essentially ignore the risk-reduction measures that apply to maintenance workers as outlined in Section 1. The use of protective clothing and application of good hygiene, and dust suppression, would essentially reduce the exposure pathways to workers to negligible levels. Although the risk calculation indicates a low risk, these precautions should still be taken because it is desirable to reduce exposure to as low a level as possible, and there may be concentrations of pesticides around the trenches higher than those detected in the D&M [Dames & Moore] study."

5.2 WHS Requirements

In order to manage (and where possible remove) risks to people or the environment, the following activities are subject to specific WHS requirements:

- Excavation, restoration and working around fluid-filled cables trenches
- Storage and transport of soil and water from below the slabs
- Disposal of soil and water from below the slabs

Where people are likely to come into contact with soil around Ausgrid's cables, it is necessary to effectively manage soil and water removed from the trench (which may be contaminated with pesticides and fluid). Environmental and health control measures are emphasised to minimise the potential pollution risks to the environment, and health risks to the public and people working in or around the cables.

The minimum controls are detailed in *Network Standard NS156 Working near or around underground cables* which is available to all people working on or near Ausgrid's underground cables. Information is also detailed in **section 4.3.1**.

These controls include:

- No smoking, eating or drinking while in contact with potentially contaminated areas;
- Wash hands and face prior to smoking, eating or drinking;
- Wearing of long sleeves and long trousers. (For the concentrations present, normal laundering is considered suitable for decontamination purposes);
- Wearing of gloves. PVC coated gloves are preferred, however leather gloves are considered suitable. Gloves are not required where their use is impractical provided the work area is secured to be clear of excessive soil from below the slab and where any adjacent cables are covered;
- Wearing of safety footwear and gumboots are recommended in wet conditions; and
- Where a cable leak has contaminated the area, additional skin coverage such as disposable overalls or equivalent may be used.

Where dust is generated:

- Eye protection such as safety glasses or safety goggles should be used to avoid foreign bodies entering the eye;
- The use of dust masks should be assessed and if considered prudent they should be used;

- Dust control measures must be applied to removed soil and stockpiles;
- All loads must be covered to prevent dust generation and dispersal; and
- Minimisation of dust generation when unloading waste.
- Ausgrid procedures that are relevant include:
- this document
- Safe Work Method Statements

5.3 Communicating with the Public

Any concerns raised by members of the general public are addressed in accordance with Ausgrid's incident response procedures. These procedures detail how to respond to leaks, concerned customers, contact with the EPA and any other enquires regarding this issue.

6 Management Strategies

6.1 Benchmarking

In 2001 a national Strategic Technology Programme (STP), which is part of an international network of regional STPs, was formed by eleven of Australia's electricity utilities. The founding members of the Australian STP were: Ausgrid (formerly EnergyAustralia), United Energy, Energex, Endeavour Energy (formerly Integral Energy), Ergon Energy, Powerlink, North Power, Aurora Power, Powercor, AGL Electricity and Citipower. The objective of the STP is to share knowledge, research results and technology development projects. The group is managed by the Energy Networks Association (ENA) on behalf of members. The STP provides a forum where Ausgrid can keep abreast of technological developments both nationally and internationally.

A narrow review of practices used at other electricity utilities revealed the following:

Table 6-1 Review of international utility practices

Electricity Utility	Current Practices
Consolidated Edison (New York)	• Oil filled cable network is predominately constructed of 'Pipe in Trench' which differs in design to Ausgrid's system but subject to similar constraints. • A programme to replace oil filled feeders with solid cable (XLPE) where they cross waterways.
Com Ed, Chicago	• Oil filled cable network is predominately constructed of 'Pipe in Trench' which differs in design to Ausgrid's system but subject to similar constraints. • Do not have direct laid oil filled cables. • A programme to replace oil filled feeders with solid cable (XLPE) commenced in 1996.
China Light and Power	• Cable replacement based on technical and economic justification. • Replacement of oil filled feeders with solid cable (XLPE). • Minimal environmental regulator involvement.

Electricity Utility	Current Practices
UK National Grid	• This cable network is comparable in design to Ausgrid's system, but is considerably older (1940s+). • A programme of refurbishing underground cables. • A programme to replace oil filled feeders with solid cable (XLPE) when they reach the end of their service life. **Note:** these cables are up to 25 years older than Ausgrid cables
Yorkshire Electricity	• Oil filled cables are monitored by automatic alarms. • Use biodegradable fluid instead of mineral oil. • Replacement of oil filled feeders with solid cable (XLPE). **Note:** These practices are the same as those used by Ausgrid
TXU UK	• Replacement of oil filled feeders with solid cable (XLPE). • A programme of refurbishing underground cables.

This search has verified that Ausgrid's maintenance practices, leak location techniques and refurbishment/replacement are equivalent to those used by other utilities.

6.2 Monitoring and Maintenance

Ausgrid carries out periodic tests and inspections of its fluid filled cable systems to identify potential failures. All fluid filled cables are constantly monitored remotely via alarmed pressure gauges fitted at fluid feed points. These gauges are fitted with alarms that register in the control room when pressure drops below the threshold level. Additionally, periodic manual gauge readings are undertaken to check the performance of the monitoring equipment and to endeavour to identify trends in fluid pressures before an alarm is triggered. **Table 6-2** below details the planned maintenance checks and schedule used by Ausgrid.

Table 6-2 Maintenance Schedule

Test	Purpose	Frequency
Sheath integrity	Indicates the condition of the outer (generally PVC) serving of the cable. If damaged, subsequent corrosion of the metallic sheath could lead to cable fluid leaks and ultimately breakdown of the cable. Cable must be out of service for this test to be undertaken.	5 yearly
Oil pressure Manual gauge readings	Testing is undertaken to confirm that pressure switches and alarms are operating correctly. Trends in cable fluid pressures can be identified which is an indicator of potential leaks - readings are to be recorded and checked against previous readings to determine whether the cables have a leak. Single level alarms Multi-level alarms	 6 monthly 12 monthly

Test	Purpose	Frequency
Test cable fluid • Dielectric Strength greater than 25kV • Moisture Content (Karl Fischer test) • DLA not more than 15 milliradians • Residual gas pressure • Dissolved Gas Analysis (DGA)	Checks the quality of the insulating fluid of the cable. This information can be used to assess the possible rate of degradation of the cable insulation.	5 yearly
Monitoring equipment (pressure gauges, pressure switches, valves and manifolds)	Monitoring equipment is inspected and tested to confirm reliability. Single point. Multi point.	 3 monthly 6 monthly
Earthing check	Check cable serving insulation resistance to earth for each cable section is greater than 1MΩ	5 years
SCADA	Electronic alarm system.	Continuous

6.3 Leak Detection and Location

When a leak occurs, resulting in a drop in fluid pressure below threshold limits, alarms are initiated and leak detection procedures are implemented. However, very small leaks are almost impossible to locate as a flow rate of approximately 5L/day is needed before the leak can be located. Below this rate there is no known proven and reliable method for locating the leak. Trials have occurred, examining the feasibility of using perfluorocarbon tracer gas, injected into the cable fluid, to provide a reliable method for leak detection at rates <5l/day. These trials have shown that the technology is still being developed for use in Australia at this stage and Ausgrid is continuing to further investigate the use for future applicability. Currently, if the leak is <5L/day, regular checks of the on-site gauges are undertaken along with visual inspections of the section of cable with the leak.

Ausgrid uses two methods to detect the occurrence of a fluid leak

- Alarms indicating low pressure in a section of cable and
- Reading of fluid pressure gauges.

Once a fluid leak can be located, a digital manometer is used to detect which phase has the leak and the leak rate. The actual leak location is found by using either the flow board method or by freezing sections of the cable (See **Appendix D**). Fluid pressure may be reduced when the leak becomes severe and the cable has been de-energised. However, it is necessary to keep fluid flowing in the cable to prevent further damage.

Ausgrid uses flow board techniques as results can be achieved more rapidly, at lower cost and without potential damage to the cable. Flow boards can generally provide an identifiable result within eight hours, whereas a series of freezes on a section of cable may take 1-2 weeks and generate additional waste as more excavations will be needed.

Other possible leak location methods are discussed in **Appendix D**.

6.4 Preventing damage by 3rd parties

The likelihood of unauthorised excavation (that is not approved by Ausgrid) in the vicinity of the cables is minimised by following mechanisms:

- Ausgrid has a comprehensive public awareness campaign focused on the public safety around electrical infrastructure. The 'Dial-Before-You-Dig 1100' service used by excavation companies offers early warning to people wishing to excavate in the vicinity of any underground infrastructure (ie electrical and communication cables, gas, sewage and water pipes etc).
- New legislation was introduced in 2009 to make it compulsory under the *Energy Legislation Amendment (Infrastructure Protection) Act 2009* to notify Dial Before You Dig of the time and place of excavation works no more than 30 days before works commence. In addition penalties for inference with electricity and gas works have been doubled and network operators can recover costs associated with damage to mains and cables. In some cases the locations of 132 kV underground cables are indicated by appropriate markings on the roadside and kerb.
- Route markers are installed along the non road sections of transmission cable routes. The above ground markers are a visual indicator of underground transmission cable routes to warn people of the presence of these cables. The markers include contact details and are inspected as part of regular maintenance activities.
- In the event of unauthorised excavation actually taking place, the presence of a concrete slab (or polymeric covers) above cables marked 'Danger Electricity', alerts an excavator before there is the possibility of reaching the cables and contaminated soil.
- Ausgrid provides a qualified 'standby' person to oversee all excavations within 2 meters of all transmission cables to ensure work is undertaken in accordance with the relevant standards to prevent damage.
- The routes of strategically important 132kV cables are patrolled regularly by Security Patrols to detect any civil works which may pose a risk of damage to the cables.

6.5 Repairs

Repairs are carried out as soon as the leak has been located and the relevant Network and Authority approvals (eg RMS) have been obtained. Repairs involve excavating the damaged cable/joint and determining the reason for the leak (eg cracked fluid pressure seal) and thus the repair necessary. A specialist team undertakes the repairs and once finished the trench is reinstated. This generally takes 3-5 days once the fault has been identified. Additionally when repairs are undertaken:

- all replacement fluid pumped into the cables is biodegradable linear alkylbenzene
- whenever a leaking joint is excavated, subject to Network constraints, the pressure seals of all joints within that excavation are checked and remade, if necessary, to ensure that the risk of a fluid leak at this point is minimised
- fluid cables are only used to replace existing sections of fluid-filled cable where it is impractical or uneconomic to use non-fluid-filled (polymeric) cable
- soils removed from above and below the slab are kept separate. The soil obtained from below the slab has an effective concentration of pesticide and placing that soil back under the slab (in accordance with Ausgrid's guidelines) ensures continued protection of the cable – any soil that is contaminated with cable fluid is not replaced in the trench but is properly classified and disposed
- in the case where replacing the soil is not possible, or additional protection is required, such as in areas of high termite activity (Eastern Suburbs); consideration should be given to the protection mechanisms outlined in **Appendix E**; and
- work on fluid-filled cables is only permitted by fully qualified and experienced pressure cable staff.

Ausgrid has also taken a number of steps to ensure there are suitable resources and technical expertise to carry out repair and maintenance work on its Fluid Filled Cable network now and into the future. These actions help to ensure cable leaks are repaired quickly and to the highest standard to reduce the time taken to repair cable leaks and reduce the occurrence of future leaks. These actions include:

- storing suitable 'Network Spares' of equipment and materials required for the repair of fluid filled cables to allow the early repair and maintenance of damaged and leaking equipment
- employing specialist staff and providing ongoing training for these staff for the repair and maintenance of fluid filled cables
- providing round the clock 'on-call' staff available to respond to cable fluid leaks.

6.6 New and Replacement Infrastructure

No new fluid-filled cable circuits have been installed since 1990 and all new underground cable installations are non-fluid-filled cables. Alternatives to fluid-filled cables include overhead lines and non-fluid-filled cables (eg solid dielectric type).

Whenever a section within a feeder needs to be replaced the alternatives of fluid-filled, overhead or solid dielectric are evaluated and the most practical and cost effective solution is chosen.

To install a non-fluid section into an existing fluid-filled cable requires the installation of transition joints to prevent the fluid from entering the non-fluid section. Technically a non-fluid section is also a problem as it is vital to ensure there are no "blind" spots in the circuit where fluid may drain away during extremes of temperature (typically ranging from 35° - 80°C throughout the day). This may require the installation of fluid tanks at the 'stop joints', which are likely to be located in public roads or reserves. There are maintenance and environmental concerns associated with tanks in these areas. 'Stop joints' are also significantly more expensive than a normal 'in-line' joint.

Community, political and environmental expectations (eg visual amenity) mean that overhead lines are not generally a preferred option, particularly in the Sydney metropolitan area.

6.7 Replacement program

Ausgrid's has initiated a cable replacement program aimed at retiring its fluid filled cable network. In general the programmed is planed with cables crossing major waterways prioritised for retirement by 2020, then cables crossing secondary waterways prioritised for retirement by 2025 and all remaining cables by 2030.

Over the past 5 to 10 years Ausgrid has decommissioned approximately 32km of its fluid filled cable network.

As part of the program a replacement priority has been determined on a risk assessment which considers both environmental factors and network needs. The replacement priority addresses environmental risk of the fluid filled cable network while meeting the operational needs of the network. The risk assessment considered:

- leakage rates
- feeder reliability
- availability for service
- environmental sensitive (river crossing)
- access limitations (RMS road)

The program will be delivered across multiple regulatory periods and delivery of the program will be subject to funding approval for the 2015-19 and future regulatory periods from the AER.

Figure 6-1 Proposed fluid filled cable replacement program – Sydney area

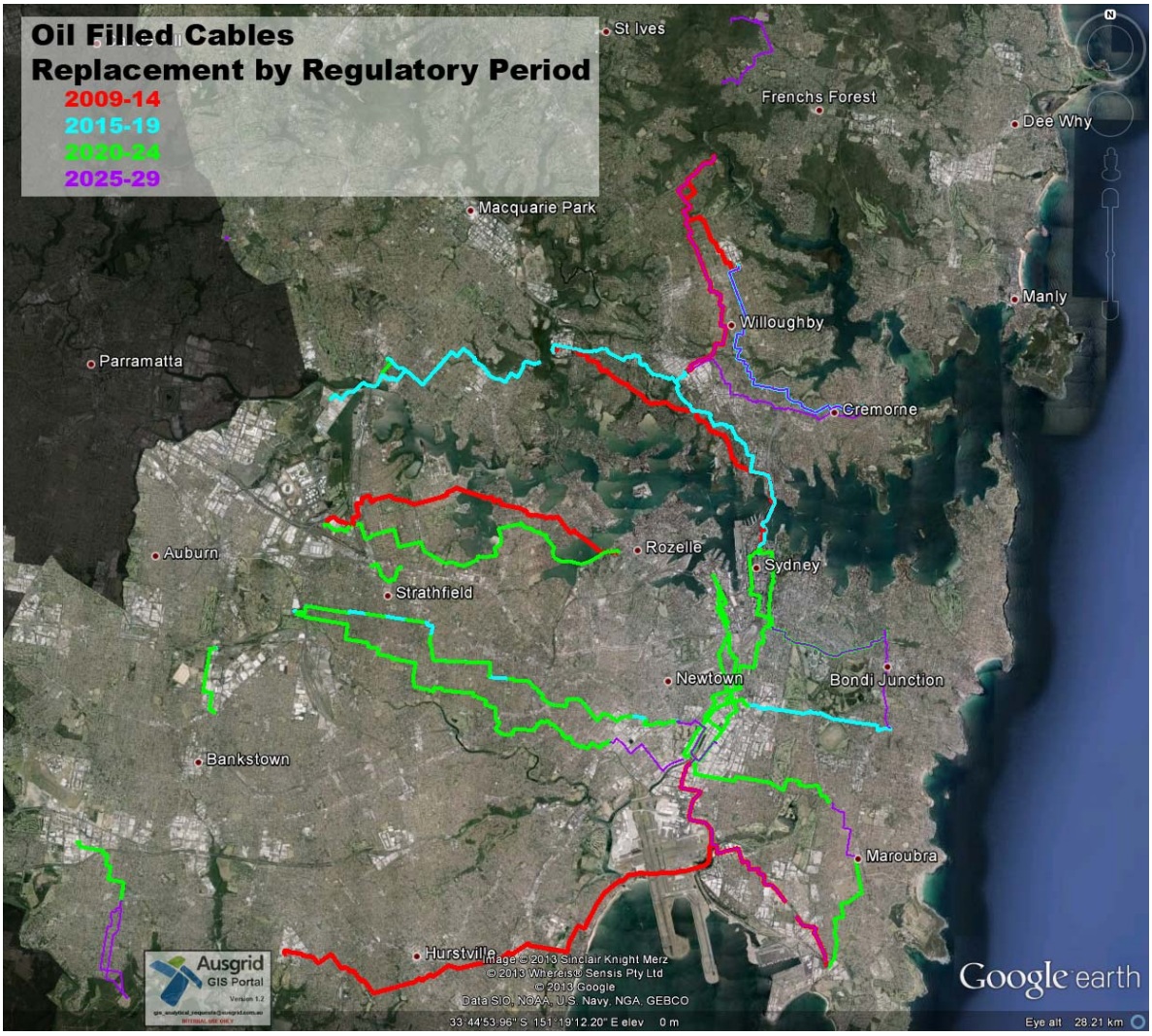
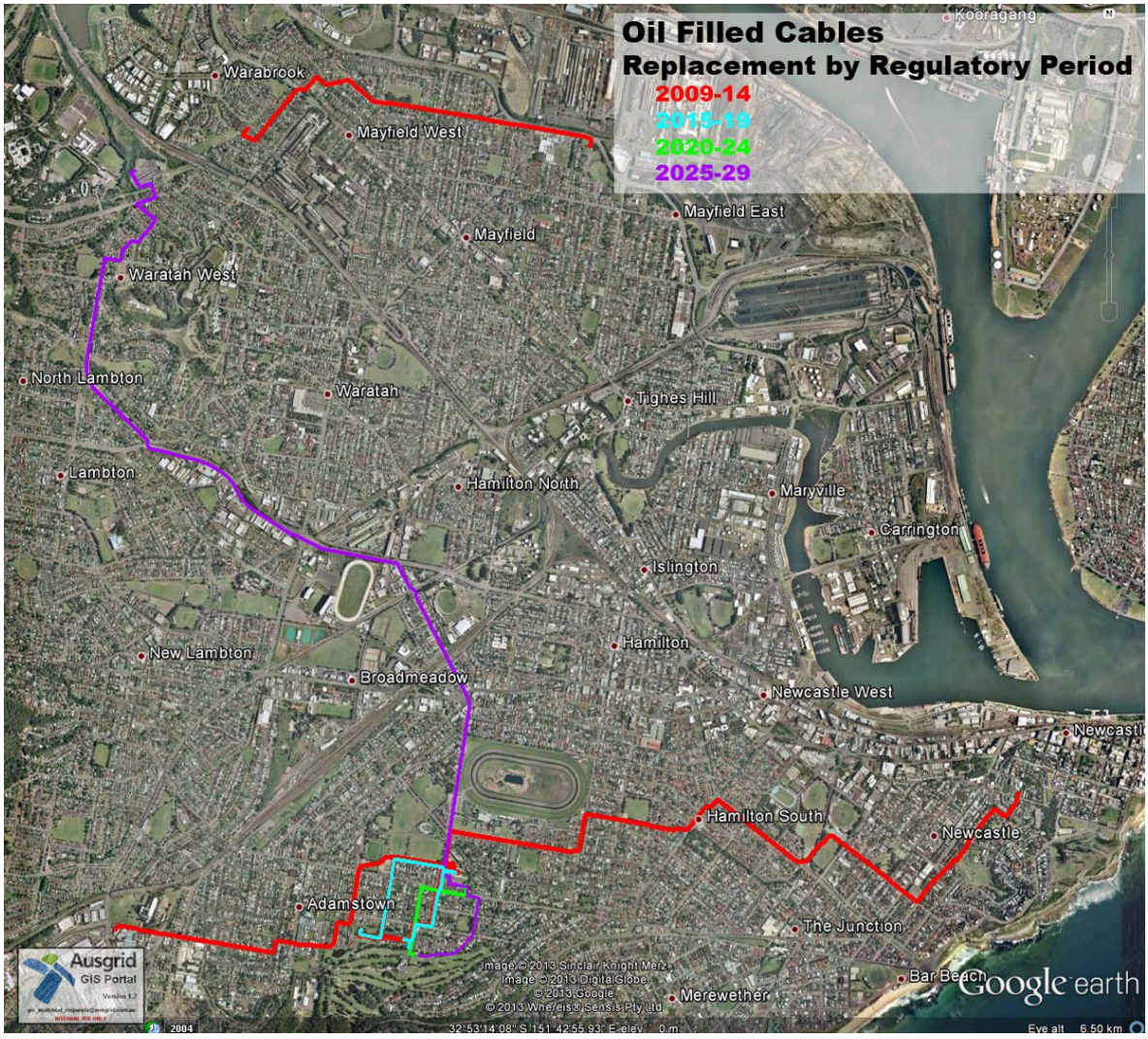


Figure 6-2 Proposed fluid filled cable replacement program – Newcastle area



6.8 Decommissioning fluid-filled cables

When fluid filled cables reach the end of their useful life, there are 3 key options for decommissioning:

1. Drain, remove and dispose the fluid filled cable, or
2. Drain the fluid filled cable and re-commission the cable for lower voltage use, or
3. Drain the fluid filled cable and abandon the cable insitu.

In October 2007, Parsons Brinkerhoff prepared an Environmental Risk Assessment for the Removal of Submarine Transmission Cables from Pyrmont to Rozelle Bay. This risk assessment identified that all three options (remove, re-commission and abandon) present potential risks to the environment which must be addressed and will require project specific solutions.

Fluid filled cables were traditionally 'direct laid' in trenches and often within the carriage way of major roads and transport corridors. As such there would be significant costs associated with their removal, the work has the potential to cause significant disruption to the community and there are risks to other utility services buried in close proximity to the cables.

Given the potential environmental impact associated with their removal, technical feasibility and social benefit it is considered that abandoning these cables in-situ presents the best available option in most situations. This is also consistent with practices of other international electrical utilities.

Ausgrid's general practice is to remove as much fluid as is reasonably practicable and then leave the drained cable in-situ. This activity generally includes:

- cut, cap and make the cable safe
- drain free fluid from the cable
- removal of any underground and aboveground fluid tanks
- removal of any associated cable accessories (e.g. link boxes)
- retain the cable listing on Ausgrid's GIS to enable reporting for DBYD enquiries

However, the final solution will depend on technical and site specific environmental requirements of each decommissioning project.

7 Environmental Management Plan

Minimising the environmental risk associated with the operation, maintenance and repair of fluid filled cables is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from cables maintenance, repair, reporting, replacement and other improvement projects outlined in this strategy.

Key measures include:

- Use of biodegradable linear alkylbenzene as the replacement fluid for the cables.
- A commitment to use non fluid filled (Cross Link Ply-Ethylene (XLPE)) cables for all new feeders.
- A range of strategies to prevent unauthorised excavation such as Dial Before You Dig, patrols, handouts and seminars.
- Maintenance, monitoring, resourcing and training procedures.
- Internal and external reporting procedures commencing when leak rates reach locatable levels (currently 5L/day).
- A commitment to continue to target fluid losses 30% below the 2009 (which was a 15% reduction on the 2001 level) target.
- A commitment to adopt proven technologies that will improve performance as soon as possible.
- Ausgrid is currently planning for the replacement of fluid filled cables by 2030 (target date, subject to AER approval of appropriate levels of capital funding).
- A commitment to report against, review and update this plan on an annual basis.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **1. Prevention of Damage by other than Ausgrid.**						
To minimise the likelihood of excavation causing damage to underground cables.	Increased awareness to external parties of cable locations to prevent unauthorised digging.	**1.1.1** - The 'Dial-Before-You-Dig' 1100 service used by excavation companies offers early warning to people wishing to excavate in the vicinity of any underground infrastructure.	Ongoing service.	Network Data & Performance.	Ongoing service provided.	Ongoing service provided.
		1.1.2 - Ausgrid provides a standby person for works near 132kV fluid-filled cables to ensure no damage occurs.	Ongoing service.	Underground Transmission Mains.	Ongoing service provided.	Ongoing service provided
	Increased awareness to external parties of dangers of unauthorised digging.	**1.2** - Ausgrid participates in periodic DBYD seminars for civil contractors.	Ausgrid participates in periodic Dial Before You Dig (DBYD) seminars for civil contractors, presenting information on the hazards associated with damaging Ausgrid cables, how to avoid it and reading Ausgrid plans.	Network Data & Performance.	Seminars attended as required.	Seminars attended as required.
	Use of route markers in non-road sections of sub-transmission cable routes as documented in NS168.	**1.3** - Route Markers installed and maintained for cable sections installed in locations other than public roads.	Route markers for non road sections are inspected and maintained during 5 yearly maintenance inspections.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	Warning slabs/covers in place in all cable trenches as documented in NS168.	**1.4** - In the event of unauthorised excavation actually taking place, the presence of a protective markers above cables marked 'Danger Electricity', alerts an excavator before there is the possibility of reaching contaminated soil.	Protective markers are installed in all trenches and any damage during repairs or due to unauthorised excavation are replaced.	Underground Transmission Mains.	Ongoing.	Ongoing.
	All unauthorised digging is detected before damage occurs.	**1.6** - Patrol the routes of strategically important 132kV cables to detect any civil works which may pose a risk of damage to the cables.	Patrol nominated routes at specified frequency. All 132kV fluid-filled cables are patrolled at intervals ranging from 1 day to 1 week, depending on system importance.	Underground Transmission Mains.	Ongoing.	Ongoing.
Aspect **2. Maintenance**						
To maintain cables in optimum operating condition, To identify any weakness prior to a leak occurring and To maximise life expectancy of system.	All maintenance checks are carried out on schedule and identified problems are addressed promptly.	**2.1** - Regular preventive maintenance programme.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	All monitoring equipment maintenance for 2012-2013 completed.	All monitoring equipment maintenance schedule completed each financial year.
	5 yearly.	**2.2** - Sheath integrity test.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	Maintenance undertaken as required.	Maintenance undertaken as required.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	3 – 6 monthly.	**2.3** - Fluid pressure monitoring.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	All monitoring equipment maintenance for 2012-2013 completed.	All monitoring equipment maintenance schedule completed each financial year.
	3 monthly.	**2.4** - Pressure monitoring equipment.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	Maintenance Schedule completed for 2012-2013.	Maintenance schedule completed each financial year.
To ensure cables are adequately protected from attack by termites.	Ongoing protection against termite attack.	**2.5** - Where repairs are undertaken the soil obtained from below the slab has an effective concentration of pesticide and placing that soil back under the slab ensures continued protection of the cable.	No damage arising from termite activity.	Underground Transmission Mains.	Ongoing.	Ongoing.
	Adequate termite protection in high termite risk areas showing termite damage (excluding roads).	**2.6** - Anti-termite 'Termimesh' protection applied in areas of identified termite activity (excluding roads). Cable replacement may be accelerated depending upon the extent of the problem, cable age and cable condition.	Anti-termite 'Termimesh' protection applied in these damaged areas or cable replacement accelerated.	Underground Transmission Mains.	As required.	As required.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **3. Leaks.**						
To respond promptly to a known leak which is locatable (ie >5L/day) and to minimise the time to undertake the repair.	Minimise time from when leak >5L/day identified to when feeder outage obtained.	**3.1** - Transmission to request network outage from Network Control and notify Environmental Services within one business day of leak reaching >5L/day as identified from pumping sheets to obtain feeder outage.	Outage requested from Network Control and Environmental Services notified within one business day of leak reaching >5L/day as identified from pumping sheets.	Underground Transmission Mains Network Data & Performance.	Monthly reports prepared pending migration into SAP.	Cable fluid losses captured in SAP.
	Minimise time from when leak >5L/day identified to when notify EPA.	**3.2** - Notify the EPA of leaks >5L/day which cause or threaten material harm to the environment immediately after becoming aware.	EPA notified by Environmental Services immediately after notification.	Environmental Services Underground Transmission Mains Network Data & Performance.	Monthly reports prepared pending migration into SAP.	Cable fluid losses captured in SAP.
	Minimise time from when leak >5L/day identified to locate leak.	**3.3** - Continue to use technology which gives the quickest and most accurate result in locating leaks.	For all leaks >5L/day, leak location commenced within 3 working days of feeder outage. **NOTE** – subject to Network constraints, road authority conditions and rain.	Underground Transmission Mains.	Ongoing.	Ongoing.
		3.4 – Improve visibility of fluid pressure and alarms on fluid filled cables.	Investigate and report on the ability to install digital fluid pressure monitors and alarms on the cable network connected to SCADA.	Underground Transmission Mains.	Undertake trial and report on findings.	Recommendations implemented.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	Minimise time from when leak >5L/day identified to when leak stopped.	**3.5** - Measure the mean time from when leaks reach >5L/day as identified from pumping sheets, to when repairs commence.	Collect data in ST cables database and analyse mean time on a monthly basis.	Underground Transmission Mains.	Ongoing.	Ongoing.
	Technology able to accurately locate leaks at a rate lower than 5L/day.	**3.6** - Investigate new technologies in order to improve locating leaks and to be able to detect leaks at lower rates.	Proven technologies are adopted as soon as practical.	Underground Transmission Mains.	Investigate and report on the use of Tracer Gases (PFT) for leak location.	Ongoing.
To progressively reduce fluid losses due to leaks (excluding 3rd party damage).	Continue to target fluid losses 30% below the 2009 target (excluding 3rd party damage).	**3.7** - Fluid loss reporting (including records of leaks) to monitor fluid losses at least quarterly.	Fluid loses in 2014-15 are 30% below the 2009 levels, presented as a 12 month figure.	Underground Transmission Mains.	Target a monthly rolling average leak rate of 1956L (70% of 2009 level) or below (excluding 3rd party damage).	New target to be identified.
To use the opportunity of an open excavation to inspect and where necessary repair all joints not just the damaged ones to ensure that the risk of further leak at this point is minimised.		**3.8** - Whenever a joint bay is excavated, the pressure seals of all joints within that excavation are checked and, if practical, remade and reinforced.	Records of all repairs and checks. Wherever possible all joints within a bay are remade, however this may not be possible if the feeder is urgently required back in service. In these circumstances the joints will be put into the planned works programme.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
To better understand the fault/defect histories of the system and failure modes and to use this information to identify those sections most at risk of damage/fault.	Identify high risk sections and renew/replace.	**3.9** - Review of records for each feeder to identify those with a history of fault/damage/leaks. Prioritise feeders based on risk and develop a risk management strategy for high risk sections once within regulatory period.	Feeders to be ranked on frequency of defect events and network down time. Sections of feeders with high risk (cross waterways) identified. Risk Ranked prioritised list of feeders for replacement identified, and Summary Condition Reports for individual feeders prepared where required.	Maintenance and Replacement Planning.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans*.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .
		3.10 - Trend analysis based on records.	Volumes of cable fluid pumped are monitored, rolling averages produced and compared to target levels.	Underground Transmission Mains Environmental Services.	Reporting Quarterly for ESIP.	Reporting Quarterly for ESIP.
Aspect **4. Repairs**						
To undertake all repairs promptly and to minimise as far as practical the time taken for repairs.	All repairs for leaks >5L/day are initiated immediately leak has been located (subject to Network constraints).	**4.1** - Carry necessary material/parts etc in stock to ensure ability to immediately repair damaged cable/joints etc.	No repairs are delayed awaiting materials/parts.	Underground Transmission Mains.	Ongoing.	Ongoing.
		4.2 - A 24 hour call out repair service is provided so that early action in the event of a major leak can be initiated.	A 24 hour contact number is provided.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
		4.3 - Suitably trained staff available for the repair and maintenance of fluid filled cables	Provide ongoing specialist training for staff involved in maintenance and repair activities.	Underground Transmission Mains.	Ongoing.	Ongoing.
		4.4 - Work on fluid filled cables is only permitted by suitably qualified and experienced staff.	Experienced staff to control work on fluid filled cables.	Underground Transmission Mains.	Ongoing.	Ongoing.
To reduce the likelihood of long term contamination of soil/water, by cable fluid, arising from leaks.		**4.5** - All replacement fluid in the cables is to be of the biodegradable type (linear alkylbenzenes – LAB).	Only biodegradable cable insulating fluid is purchased.	Underground Transmission Mains.	Ongoing.	Ongoing.
Aspect **5. Organochlorine Pesticide applied to cable trenches for termite protection**						
To understand whether the risk to human health or the environment from OCPs.	To define the risk sufficiently to ensure Ausgrid is adequately managing the risk.	**5.1** - Investigations carried out by independent consultants. Update the risk assessment periodically.	Recommendations implemented.	Environmental Services.	Review if change in regulation is identified.	Review if change in regulation is identified.
To minimise the potential impact of OCPs and to avoid the need for off-site disposal of OCP contaminated soil excavated during repairs.	The risks of OCP on people, property and Ausgrid infrastructure is minimised.	**5.2** - Ceased use of OCP in 1980.	No new OCP applied to soil.	Underground Transmission Mains.	Ongoing.	Ongoing.
		5.3 - The soil removed from below the slab during repairs is kept separate from all other soils and is placed back under the slab at original depths unless contaminated with cable-fluid.	OCP contaminated soil is managed in accordance with procedures during repairs.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
		5.4 - Training of staff and contractors undertaking this work.	Training undertaken every 2 years.	Underground Transmission Mains Environmental Services.	No training required.	Training undertaken every 2 years.
		5.5 - Procedures for excavating in cable trenches.	Procedures reviewed if a change in regulation is identified.	Environmental Services Underground Transmission Mains.	Review OCP handling procedures.	Ongoing review as required.
To dispose of any OCP contaminated soil or water in accordance with relevant legislation and at EPA approved facilities.	OCP contaminated soil kept separate from non-contaminated soil.	**5.6** - Works carried out in accordance with Ausgrid EG120 Waste Guidelines.	Compliance with guidelines, waste tracking documentation.	Underground Transmission Mains Environmental Services.	Complete one audit of waste disposal documentation.	Undertake auditing as required.
Aspect **6. Infrastructure**						
To eliminate the use of fluid filled cables as the preferred technology for new feeders.	All new underground transmission circuits are to be constructed using non-fluid filled cable technology.	**6.1** - XLPE is the standard technology for new underground transmission cables.	No new fluid-filled circuits are installed by Ausgrid anywhere in Ausgrid's distribution area.	Maintenance and Replacement Planning.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
To replace known problem joints/sections of cable and thus reduce the likelihood of further leaks.	Targeted replacement based on historical data and risk.	**6.2** - Prioritised list of replacement and refurbishment sections prepared as input to the regulatory submission.	Undertake replacement and refurbishment of problem sections and straight joints in accordance with timeframes outlined in regulatory approval.	Maintenance and Replacement Planning Underground Transmission Mains.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .
To remove all fluid filled cables.	Replace / retire all fluid filled cables over 20 years (2029).	**6.3** - Prioritised list of fluid feeders for Replacement prepared as input to the regulatory submission.	Regulatory submission to include funding for next regulatory period. Transmission Mains Replacement Plan includes replacing / retiring all fluid filled cables by 2030.	Maintenance and Replacement Planning System Planning and Regulation.	*Strategic Asset Prioritisation Sub-transmission Cables* prepared and approved for submission to AER for regulatory submission.	Pending outcome of regulatory submission.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **7. Benchmarking**						
To identify reliable technology which is able to locate leaks at rates lower than 5L/day.	Technology able to accurately locate leaks at a rate lower than 5L/day.	**7.1** - Benchmarking with other utilities	Proven technologies are adopted as soon as practical.	All relevant sections as appropriate.	Ongoing	Ongoing
To be consistent with similar networks around the world in reducing leak rates on a per km basis.	Achieve the lowest leak rate for comparable transmission systems around the world.	**7.2** - Benchmark leak rates per km cable with other distributors around the world.	Prepare benchmarking reports as required to compare Ausgrid leak rates to comparable transmission systems worldwide.	Primary Systems transmission and distribution mains engineering	Review information from CIGRE conference as appropriate. Input to the Fluid Filled Cables Working Group as appropriate.	Pending outcome from review.
		7.3 - Implement this management strategy including this action plan.	Action Plan identifies improvements. Action Plan updated annually.	Environmental Services.	Consultation with all relevant Sections and update of the Strategy accordingly. Publishing Strategy on the Environmental Index and preparation of ESIP reporting.	Consultation with all relevant Sections and update of the Strategy accordingly. Publishing Strategy on the Environmental Index and preparation of ESIP reporting.

8 References

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Appendix A – Fluid Filled Cable Design and Installation

Oil Filled Cable Design and Installation

Cables

As shown in **Figure 8-1**, the basic single-core design includes a hollow duct through the centre for easy passage of fluid, copper or aluminium conductors around the duct, paper insulation and a metallic sheath to keep the fluid inside. An outer serving of PVC or other tough plastic is used to provide a protective barrier to protect the metal sheath from corrosion. In these types of cable, the paper insulation is impregnated with a thin fluid. When heated the expanding fluid can flow through the central duct to fluid expansion tanks which receive the fluid under increasing pressure, conversely when the load is reduced and cooling occurs, the fluid is forced back into the cable.

Fluid expansion tanks consist of cylindrical steel containers which contain gas-filled compressible cells. The cells are soldered airtight and all remaining space in the container is filled with oil. Depending on the expansion of the fluid due to load variations and seasonal temperatures of the ground, the vessels act to ensure the operating pressure is maintained within desired limits. Cables are supplied from the manufacturer with the fluid already in the cable and additional fluid is only put into the cables if a leak occurs. Otherwise it is a closed system and no additional fluid is required once the cable is installed.

For very long fluid-filled cable runs or where great differences in level occur, sealed stop joints are fitted to divide the static pressures and also to allow the connection of expansion vessels along the cable run. This design results in a series of locked sections which with respect to fluid content are completely independent of one another. For long cable runs, depending upon height differentials, the number of locked sections is reduced compared to those required for a level run.

The operating pressure of an oil-filled cable is normally between 1.5 and 6 bar (150 – 600 kiloPascals). Since the strength of the lead sheath only permits low internal pressures, these cables have a pressure protection tape in the form of a helix wound directly over the lead. In 3-core oil-filled cables this tape is of steel but in single-core cables it is of nonmagnetic material. For cables with aluminium sheath the tape is omitted.

Figure 8-1 Cross Section of Section Core Cable

Installation

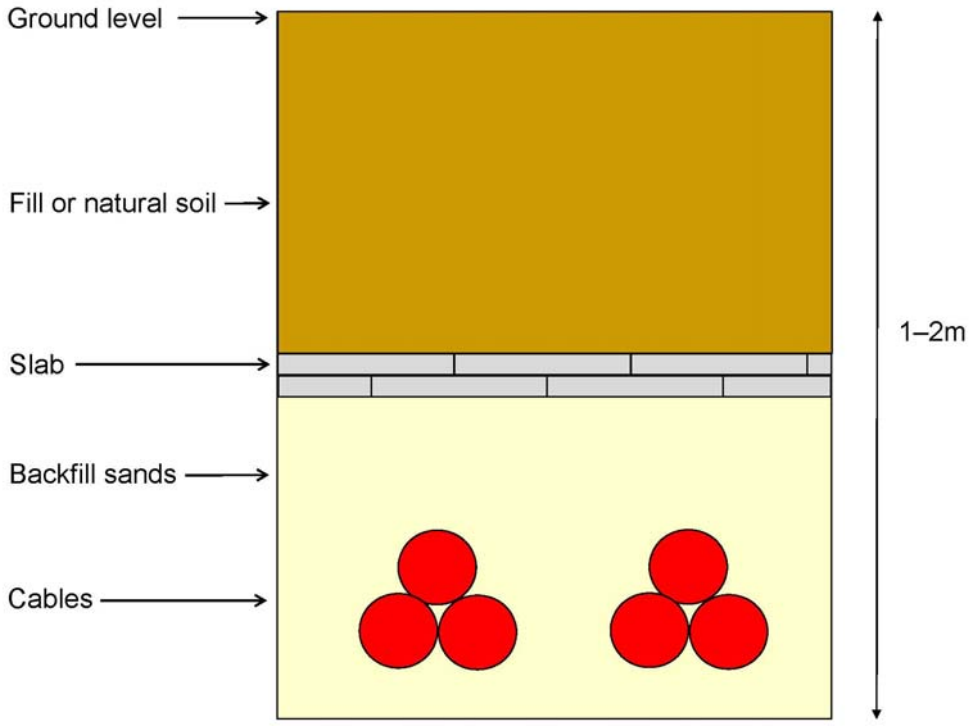
Most cables are located in road reserves (under the carriageway) at depth of 1 - 2 metres and are surrounded by sand, clay, grout, or a concrete mix. A protective concrete slab (or polymeric cover) is buried 0.1 - 0.2 m above the cables along the entire route.

Figure 8-2 illustrates a typical cable trench. Trenches may contain between 1 and 6 cables. Once installed the cables are energised and put into operation. They are then only disturbed if a fault arises.

Cables were supplied from the manufacturer with the fluid already in the cable and additional fluid is only put into the cables if a leak occurs. Otherwise it is a closed system and no additional fluid is required once the cable is installed. Originally the fluid used in the cable was a highly refined mineral oil, however a blend of C11/C12 linear alkylbenzenes is now used. See **APPENDIX 2** for details on the fluid.

Within the Ausgrid network, the cables are mostly single core although there is a small percentage of 3-core cables.

Figure 8-2 Typical Transmission Cable Trench Arrangement



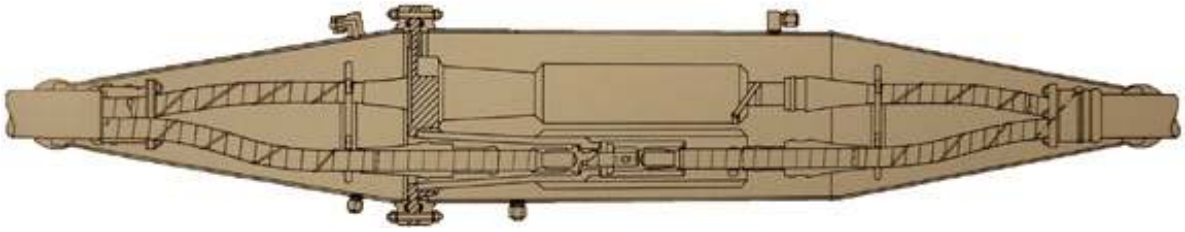
Joint Designs

Three different types of joints are used in the transmission network. The straight joint, **Figure 8-3**, is used for direct connection of two cable lengths to each other and is available in different designs. The trifurcating joint is used to joint a three-core cable to a single-core cable. (BICC Cables, 1998) In Ausgrid's network, the trifurcating joint is mainly used when connecting a submarine cable to a land cable.

Figure 8-3 Straight joint (BICC Cables, 1961)

The stop joint, **Figure 8-4**, makes a barrier to prevent fluid flow across the joint and provides a fluid feed point. This is used in long circuits, and when the cable route is undulating. In some cases the stop joint is designed as a trifurcating joint to provide a hydraulic barrier between a three-core and a single-core cable. The third joint type is the transition joint used when connecting a fluid-filled cable to a solid. Like the stop joint, the transition joint provides an impermeable barrier between the two adjacent lengths of cable. (BICC Cables, 1998).

Figure 8-4 Stop joint (BICC Cables, 1961)



All fluid-filled cable joints are enclosed with an outer protective metal box, which is, for insulation, filled with bitumen. As a feeder consists of three phases (cables) each joint bay contains three joints.

Installation

Joints are made and then a fibreglass “coffin” is placed around the joint. This coffin is filled with a bituminous material which sets and provides protection for the joint. The top is then put onto the “coffin” and the trench backfilled.

Appendix B – Linear Alkylbenzene Fluids

Linear Alkylbenzene Fluids

Alkylbenzene fluids have replaced mineral oils as the fluid of choice for insulation in fluid-filled cables. They are used as they are highly stable under electrical stress and they have a considerably enhanced ability to chemically absorb hydrogen gas, a gas which may be produced during electrical discharge activity in a hydrocarbon liquid. The superior gas absorbency of alkylbenzene has been measured at >20mm3.min-1 whereas mineral oil is measured at >2mm3.min-1.

Linear alkylbenzenes used for this purpose are clear, colourless, odourless, water-like liquids. They are readily biodegradable. The technical properties of the insulating fluid used in cables are shown in **Table 8-1** below:

Table 8-1 Technical Properties of Cable Insulating Fluids

Properties	Mineral Oil	Alkylbenzene
Viscosity, 20°C/mm3.s-1	5	<6
Flash point, open/°C	120	140
Dissipation Factor @ 90°C, tan δ	0.002	0.001
Volume Resistivity @ 90°C/GΩ.m	>50	>1000
Breakdown stress /kV.mm-1	30	40
Biodegradability BOD/COD %	11	80

Ref M.A Simmons Insulating Liquids used in Fluid Filled Cables, 1996, The Institution of Electrical Engineers

The potential contamination of the surrounding soil by the insulating fluid is an important aspect of environmental management and assessment. The release of mineral oil has the potential to cause contamination of the surrounding soil profile. An important preventative measure to minimise the threat of environmental damage is the ability of the insulating fluid to possess biologically degradable properties. This is another advantage to the use of alkylbenzene as an insulating compound for fluid filled cables. It has been documented that the biodegradability of alkylbenzene is 80% (BOD/COD) in comparison with mineral oils at 11% (BOD/COD) – a percentage above sixty is regarded as highly biologically degradable. The fluid used meets the requirements of OECD guideline 301D for ready biodegradability.

The biodegradability of alkylbenzene has been studied in recent times under aerobic and anaerobic conditions. Reports have been documented where 10 micrograms of alkylbenzene in an aerobic environment was found to have a half-life ranging from three to four days. Anaerobic biodegradation of alkylbenzene has not been examined as thoroughly, however, results based on recent findings with related compounds suggest that alkylbenzene is susceptible to microbial attack in anoxic environments.

Appendix C – Linear Alkylbenzene MSDS

Appendix D – Leak Location Techniques

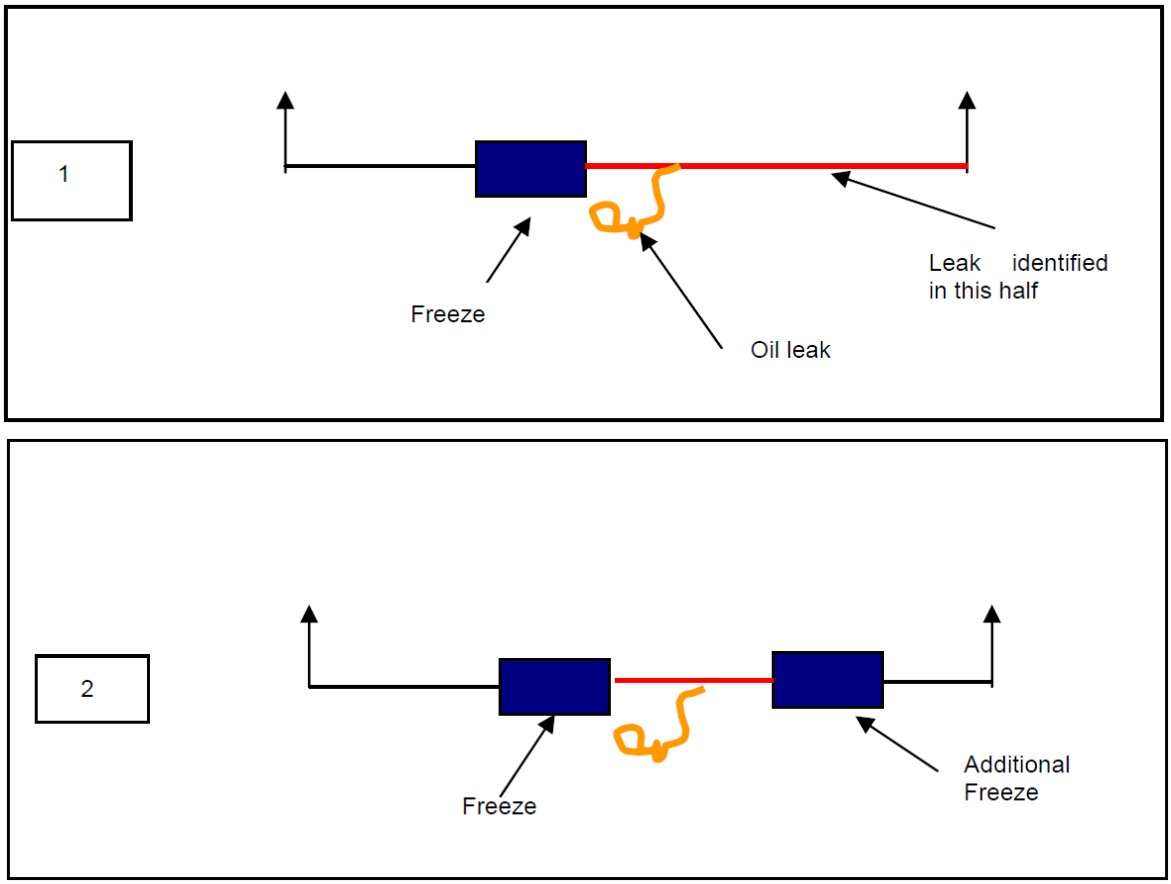
Leak Location Techniques

Once a fluid leak has been discovered a digital manometer is used to detect the phase that the leak has occurred on and the leak rate. The actual leak location is found using either flow boards or by freezing sections of the cable.

Freezing

Using liquid nitrogen, the leaking section of the cable is frozen in the middle so that no fluid can flow from one section to the other (1). Only one half will continue to leak. Another freeze is then placed in the middle of the half (2) that has been identified as the leaking half, see **Figure 8-5** below. This process is then repeated until the leak is found. This may take up to two weeks, involve more than one excavation and thus generate a greater amount of waste and community disruption. This technique also places greater stress on the cable.

Figure 8-5 Cable Freezing Methodology



Flow Boards

Flow boards determine the position of the leak by measuring the rate of flow. Three flow boards are required and are connected as shown in **Figure 8-6**. The leaking phase is connected to a healthy phase and both phases are connected to the pressure tank.

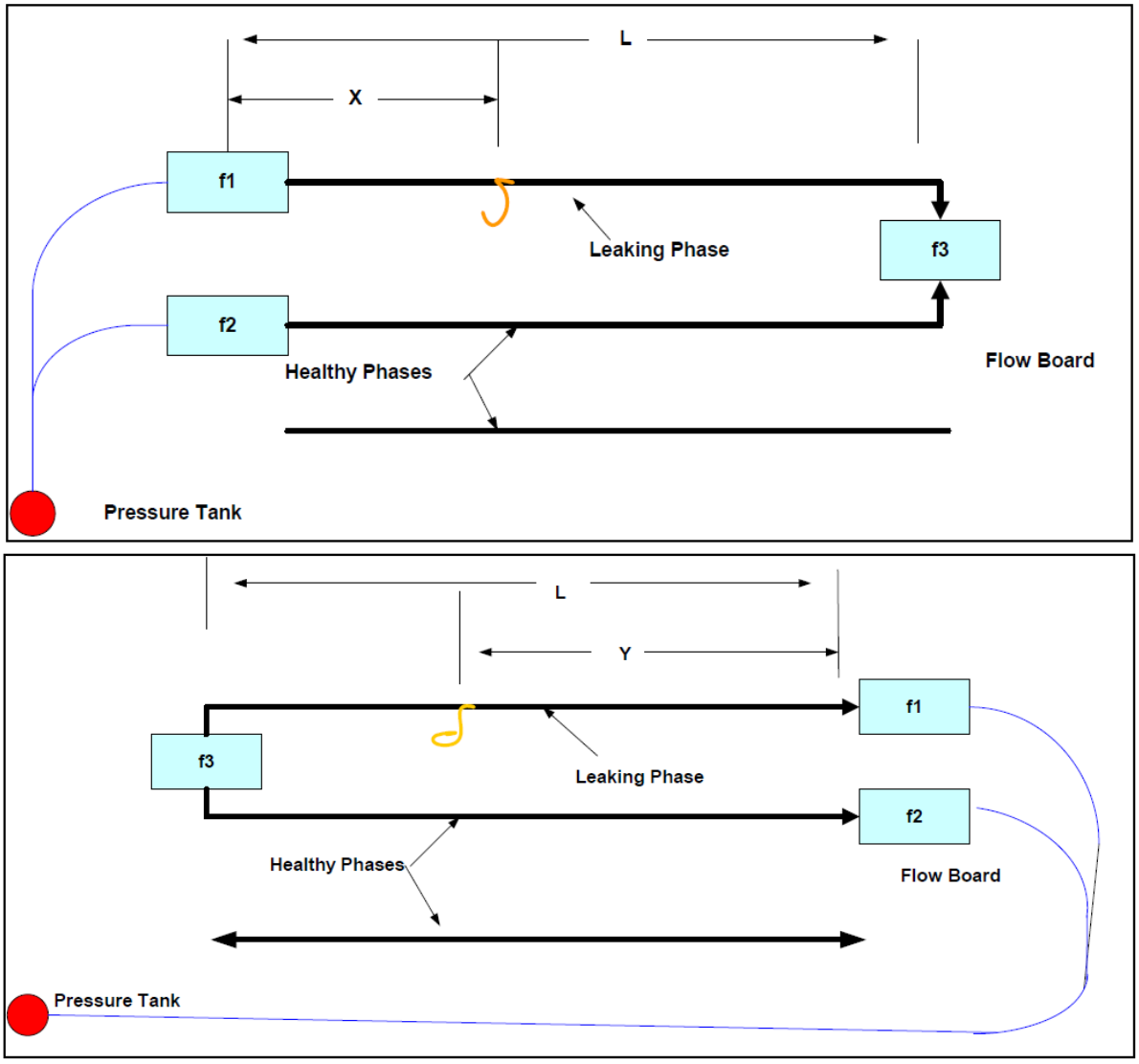
The flows from the tank to each phase (f1 and f2) and between the phases (f3) are used to determine a ratio between the distance from the leak to the pressure tank (x) and the distance of the phase to the next stop joint. The formula is as follows:

$(x/L) = 2\ f3 / (f2 – f1 + 2f3)$

The distance L is known therefore x can be can be estimated. To verify the result the phases and flow boards are rearranged and connected as shown in **Figure 8-6** below to determine (y/L) using the same formula. If the estimates are correct (x/L) and (y/L) will equal 1.

Some authorities such as EA Technology in UK appear to have refined this technique, adding computerised monitoring to improve calculation speed.

Figure 8-6 Flow Board Methodolgy



Sniffer gases

The method is based on chemicals called perflurocarbon tracers (PFTs) which are man-made gases that can be easily detected using special sensors. Because PFTs are inert they can be safely added to the insulating fluid used in the cables. If there is a leak, the trace amounts of PFTs in the dielectric fluid can be detected in aboveground air with sensors called dual trap analysers (DTAs). Once the location has been narrowed down tiny boreholes are made to pinpoint the location to within a few metres.

Comparison

Generally flow boards are the preferred method as results can be achieved more quickly at lower cost and without potential damage to the cable. Flow boards can provide an identifiable result in an eight-hour period whereas a series of freezes on a section of cable may take 1-2 weeks of work.

However flow boards are not always the best solution as accuracy is around 5% which could result in a fifty-metre deviation in a 1-km fluid section. Sections of cable involving sealing ends are susceptible to changes in temperature creating thermal flows that distort the test. Rain and vibration from heavy vehicles also causes further distortion. If more than one leak exists the result will also be inaccurate.

Freezing the cable does allow smaller leaks to be located. However freezing and unfreezing a cable puts it under considerable strain and can deteriorate the cable and could result in a greater number of leaks.

Ausgrid have used (and still do use) tracer gases for fault location on gas pressure cables. However, our experience to date has been mixed. Gas leaks in the metal sheath can let gas escape, but it sometimes travels along the cable beneath the serving, possibly for hundreds of metres, until it finds a weakness in the cable sheath through which it can escape to the air and be detected.

Currently Ausgrid uses the flow board method for locating leaks.

Appendix E – Cable Protection From Termites

Cable Protection From Termites

“Termites ... are capable of destroying plasticised PVC and certain other materials used in the manufacture of electric cables” [4]. Underground sub-transmission cables in areas of high termite activity are susceptible to termite attack and protection may be required.

The use of Aldrin and Dieldrin (and other environmentally hazardous pesticides) is banned and alternative protection methods must be used. References [4] and [7] present a number of these alternative methods including pesticides, providing a smooth surface and mechanical protection.

In considering pesticides it is very important to research their impact on the environment before they are used. A new method of applying cypermethrin, a pesticide that offers termite protection, is to incorporate the pesticide into the PVC or MDPE sheath of the cable [7]. Experiments [7] show that cypermethrin mixed with MDPE at concentrations higher than 0.12% offers good protection against termites. When PVC was used, on the other hand, the cable still suffered a slight attack. As cypermethrin is not soluble in water, it will stay locked in the cable sheath and hence this method is considered environmentally safe during operation. However, there are unresolved environmental concerns during production and disposal. For this reason, and the increasing legislative restrictions placed on pesticides, this method is not recommended.

The use of a sufficiently smooth surface (e.g. nylon grade 12 or better) prevents termites from getting a hold with their mandibles and thus protects the cable. Materials available are nylon, brass, copper and high density polyethylene (HDPE). Surface smoothness must be maintained through the installation process of the cable in order to ensure adequate protection. A sacrificial layer of PVC is usually applied over the nylon sheath to ensure protection against damage during installation [8].

Another form of protection involves providing sufficient mechanical protection to prevent termites penetrating the cable despite being able to get a hold with their mandibles. CSIRO test “have shown that High Density Polyethylene and polypropylene offer resistance to termite attack” [4] as they “have the advantage over PVC in possessing superior hardness and abrasion resistance. However “it is recognised that these two materials are not suitable for all cable types and functions”. Another option is wrapping a stainless steel mesh around the cable. The square holes in the mesh are small enough that termites cannot get their hard heads through. This method has been trialed on poles in Ausgrid. The report compiled on the trial results [9] indicated that the “Termi Mesh stocking was found to be in sound order for the depth of the excavation.” It also stated that “Termi Mesh is now made from 316 Marine Grade (steel) exclusively” and that “tests in USA have proved that 316 grade of stainless steel does not corrode in boggy ground with a high salt content”. The application of Termi Mesh may be able to be extended to protecting underground cables against termites.

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[3] John Gerozisis and Phillip Hadlington, Urban Pest Control in Australia, University of New South Wales Press Ltd, 3rd revised edition 1995.

[4] Olex Cables Limited, 20 Jan. 1981, Protection of Cables Against Termite Attack.

[5] Report by Dames & Moore, 6 June 1997, Stage 2 Environmental Assessment High Voltage Cable Trenches.

[7] Dr R. Porro et al., 15 July 1996, Termite Protection of Underground Distribution and Transmission Cables.

[8] MM cables.

[9] G. Motum, 9 April 1996, Stainless Steel ‘TERMI MESH’ Stocking for Termite Protection of Timber Poles.

Environmental Management Strategy

EMS 350 Oil Filled Equipment

Version 6, May 2013

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Contents

Tables

Glossary

AER	Australian Energy Regulator
AG	Ausgrid
cm	Centimetre
CIGRE	CIGRE is an international organisation dedicated to the identification and the development of solutions to technical issues in the power supply sector.
CO_2	Carbon Dioxide
DA	Development Application
DG	Ausgrid's distribution guideline
DGA	Dissolved Gas Analysis
EIP	Environmental Improvement Plan
EGOWS	Enhanced Gravity Oil Water Separator
EMS	Environmental Management Strategy
ENA	Energy Networks Association
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services.
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act 1979*
ISO	International Standards Organisation
kg	kilogram
kV	Kilovolt
L	Litre
m	Metre
MSDS	Material Safety Data Sheet
MVA	mega Volt Amps
OEH	Office of Environment and Heritage
OH&S	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
pH	A measure of the acidity or alkalinity of a solution
POEO Act	*Protection of the Environment Operations Act 1997*
ppm	Parts Per Million
PPS	Parallel Plate Separator
PT	Pole Top Transformer
SF_6	Sulphur Hexafluoride
STS	Subtransmission Substation
ZS	Zone Substation

Executive summary

Ausgrid is committed to the community, safety and meeting the needs of a growing energy market by effectively maintaining our assets (in accordance with the AER submission) and finding better ways to plan for our future energy demands.

Ausgrid operates over 230 sub-transmission and zone substations that typically contain 3 large oil filled power transformers with between 5,000 and 50,000L of oil and other smaller oil filled equipment including current transformers, voltage transformers, and switchgear. There are also over 30,000 distribution substations that typically contain transformers with between 100L to 900L of oil.

Transformers contain oil for electrical insulation and cooling purposes. Oil can be lost from transformers by either minor leakage during operation or as a result of failure of the transformer.

Ausgrid has an Oil Containment Program which focuses on mitigating the environmental risk across all existing and new sites. This program is managed on a risk-based approach particularly aimed at reducing risk to the environment against a major failure.

Transformers commissioned before 1997 may also contain polychlorinated biphenyls.

The management of oil filled equipment is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from containment installation, containment maintenance, equipment maintenance and other improvement projects outlined in this strategy.

Key measures include:

- The use of risk assessments for managing and prioritising risks associated with oil filled equipment
- The use of EGOWS or PPS systems for all new sub-transmission and zone substations sites as a minimum standard
- A commitment to upgrade all zone substations sites with no oil containment to sites with PPS systems within 5 years at an estimated cost of $11M (2009-14 regulatory period)
- A commitment to upgrade all zone substations sites with inadequate bunds with flame traps, new gravel and increased bund size within 5 years at an estimated cost of $15M (2009-14 regulatory period)
- A commitment to upgrade all sub-transmission substations with inadequate brick bunding, oil water separators and damaged pit and pipework by the end of 2015 at an estimated cost of $11M
- The removal of all Scheduled PCBs from existing sub-transmission and zone substation transformers
- A commitment to phase out and manage all other PCBs on the network in accordance with Ausgrid's PCB licence
- Ongoing maintenance, monitoring of equipment and containment facilities
- Training and awareness in spill response and preparedness
- A commitment to adopt proven technologies that improve performance as soon as practicable
- A commitment to report against, review and update this plan on an annual basis.

1 Scope

This management strategy outlines the management of environmental issues associated with oil loss from Ausgrid's oil filled equipment at sub-transmission, zone and distribution substations.

The management plan is not an Asset Management Plan for oil filled equipment.

The management does not address typical handling requirements for daily oil handling.

2 Background

Throughout its distribution area, Ausgrid (AG) has an extensive network of major and minor substations. Major substations refer to sub-transmission and zone substations. Minor substations refer to distribution substations which include pole top transformers, chamber type substations and street kiosks.

Ausgrid has approximately 34,000,000 L of oil distributed throughout the network in transformers, switchgear and in storage.

Transformers contain oil for electrical insulation and cooling purposes. Transformers are designed to be closed systems, such that the insulation oil is contained within the casing and does not enter the surrounding environment. However, there is potential for loss of oil via minor leaks or major failure.

There are over 230 sub-transmission and zone substations that typically contain 3 large oil filled power transformers with between 5,000 and 50,000L of oil and other smaller oil filled equipment including current transformers, voltage transformers, and switchgear.

There are also over 30,000 distribution transformers that typically contain between 100L to 900L of oil.

The management of oil filled equipment is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from containment installation, containment maintenance, equipment maintenance and other improvement projects outlined in this strategy.

3 Issues

3.1 Substations

Ausgrid has a significant volume of oil filled equipment. The majority of oil is located in 594[1] transformers which are located in over 230 sub-transmission and zone substations and 33,200 transformers which are located in over 30,000 distribution substations.

Other equipment contains minor amounts of oil - such as current transformers, voltage transformers, and oil filled switches. This equipment generally contains between 200 and 400L of oil per unit. Newer models of this equipment with alternatives to oil are now being utilised across the network. This is greatly reducing the oil volume and number of oil filled assets in service.

Appendix C provides details of the types and number of substations including sizes and estimated quantities of oil.

3.2 Transformer Oil

Insulating oil is an extract of petroleum and is therefore a pure hydrocarbon mineral oil which, when refined is relatively stable in storage and use. It is used in transformers as an insulating medium and cooling (heat transfer) medium and in oil circuit breakers as an insulating medium and arc quenching medium.

[1] Refer to Appendix C

Transformer oils used by Ausgrid contain additives that enhance their physical and chemical properties – eg. inhibitors, and additives that retards oxidation are present in most transformer oils. The oil used in most newer transformers is also passivated. Neither of these additives alters the flashpoint temperature.

Transformers commissioned between before 1997 may contain polychlorinated biphenyls (PCBs). Ausgrid is managing equipment containing PCBs in accordance with the National PCB Management Plan and the NSW Environmentally Hazardous Chemicals Act, 1985.

The essential properties and characteristics of insulating oil are covered in the Australian Standard AS 1767-1975 'Insulating Oil for Transformers and Switchgear'. The detailed methods of handling and testing insulating oil are covered in Australian Standard AS 1883-1976 'Guide to Maintenance and Supervision of Insulating Oils in Service'.

Transformer oil is classed as a combustible liquid by Australian Standard 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. Its flashpoint varies between 140° and 148°C classifying it as a class C1 Combustible liquid. The Standard classifies Flammable Liquids as those with a flashpoint temperature of less than 60.5°C (closed cup test), whilst combustible liquids are identified as being 'any liquid, other than a flammable liquid, that has a flashpoint, that is less than its boiling point'.

3.2.1 Alternatives to mineral oil filled transformers

Dry type transformers

Dry type transformers do not contain oil, however, they are not considered a suitable alternative for large oil filled transformers. Dry Type Zone Transformers are typically limited to 30MVA capacity and prohibitively expensive. Dry type transformers can add more than $1M to the cost of a new zone transformer and are not available in all the sizes required by Ausgrid. They also result in compromises like much larger sizes, reduced output range, excessive noise, increased level of electromagnetic leakage and increased maintenance requirements.

Sulphur Hexafluoride (SF_6)

SF6 is used mainly as an insulator in modern electrical switchgear, but can also be used in a variety of equipment including transformers. Although SF_6's chemical and physical properties make it seem attractive for the applications above, SF_6 is one of the most potent "Greenhouse" gases with a global warming potential 23,900 times greater than that of carbon dioxide.

The notional SF_6 greenhouse impact costs over the operational life of the equipment as follows:-

Notional cost over n years =

$$23\,900 \times \sum_{i=1}^{n} \text{[Leakage of } SF_6 \text{ in year } i\text{]} \times \text{[Carbon credit rate in year } i\text{]}$$

The notional cost is based on the following assumptions:

- SF_6/CO_2 Greenhouse Index — 23 900
- Leakage rate yrs 1-5 — 0% by total volume
- Leakage rate yrs 6-20 — 0.5% by total volume
- Leakage rate yrs 21-35 — 1% by total volume

In accordance with the Ozone Protection and Synthetic Greenhouse Management Act 1989, from 1 July 2012 an equivalent carbon price will be applied to certain synthetic greenhouse gases including SF_6 (and equipment or products which contain it). The equivalent carbon price will be in the form of a levy which will initially be set and then adjusted annually for three years. The proposed prices are:

- $23.00 / tonne in 2012/2013 financial year
- $24.15 / tonne in 2013/2014 financial year
- $25.40 / tonne in 2014/2015 financial year

- After 2015 the carbon price will transition to a flexible price under an emissions trading scheme, with the price being determined by the market.

SF_6 transformers are available at a large price premium. These transformers are not locally made and must be imported. Considering the cost, availability and greenhouse gas implications, SF_6 transformers generally are not considered a practical or appropriate alternative to oil filled transformers.

Alternatives to mineral oil (transformer fluids)

A number of alternative transformer fluids exist that can be used instead of petroleum-based mineral oil. These fluids have electrical properties that make them suitable for use in some transformers but with improved biodegradability rates. Furthermore, these fluids generally have a higher fire point and flash point, which significantly reduces the risk of a fire. The price of these fluids varies, but they are generally more expensive than mineral oil.

Furthermore these fluids have many different properties to mineral oil eg viscosity, ability to transfer heat, affinity to moisture; as well as some differences in electrical properties. Some of these fluids are also prone to rapid deterioration in the presence of oxygen, so can only be used in sealed transformers. Different processes and support infrastructure may also be required for handling and processing these fluids to prevent mixing with traditional mineral oil and prevent exposure to oxygen.

In some limited situations these alternative fluids have been used to reduce fire risk or for the technical and environmental benefits. New transformers can be designed to be suitable for use with one of these alternative fluids, and retro filling of existing transformers may be possible after careful assessment by a transformer specialist.

The requirements for storage and use of these fluids is the same as for mineral oil eg transformer bunds are still required. However, biodegradable oils may offer some benefits in clean-up and remediation and potentially provide reduced risk in environmentally sensitive areas, where a spill would pose a threat to marine life.

Polychlorinated Biphenyls

Ausgrid used polychlorinated biphenyls (PCBs) in a concentrated form as a dielectric in some small volume high voltage electrical equipment since the 1920s. The practices at the time, combined with the belief the PCBs were not harmful, lead to cross contamination, resulting in large amounts of mineral insulating oil becoming contaminated.

In the late 1970's, the purchase of equipment containing PCBs ceased.

In 1989 Sydney Electricity commenced a replacement program for equipment containing pure PCBs[2]. This program was temporarily suspended due to the commonwealth government banning the export of hazardous wastes.

In 1997 Ausgrid commenced a replacement program for all equipment containing Scheduled PCBs as part of a management plan for all equipment containing PCBs.

Ausgrid manages PCBs in accordance with the, "Polychlorinated Biphenyl Wastes (PCB) Chemical Control Order 1997" and a licence issued by the EPA. The management of PCBs is covered by another strategy, *EMS 410 – PCB Management Strategy*.

Ausgrid has completed the removal of all Scheduled PCBs from all sub-transmission and zone substation transformers.

3.3 Oil Loss from Transformers

Oil can be lost from transformers by minor leakage or as a result of failure of the transformer.

[2] Pure PCBs are defined as liquid dielectrics, which typically contain a mixture of 70% PCB and 30% thinner, i.e. 700,000mg/kg of PCB.

The likelihood of rupture is extremely small; transformers are designed to operate under high voltages and currents in outdoor locations. The estimated frequency of major leaks (eg due to lightning strike, for Ausgrid's transformers is one per 10-20 years for sub-transmission and zone transformers and one per year for distribution transformers).

More information about transformer failure modes is given in **Appendix B** Major Transformer Failure Information.

Most transformer failures result from the failure of the ancillary components (ie tap changes, bushings, cable boxes and link boxes) rather than from within the tank itself.

Recommendations to minimise the frequency and consequence of transformer failures include:

- Testing of the insulation oil to detect defects (such as Dissolved Gas Analysis (DGA))
- Ensuring that maintenance is carried out correctly on tap changers.
- Ensuring that bushings are tested regularly and replaced as required. Note: Ausgrid has a proactive 132kV Substation bushing replacement program.
- Ensuring that cable boxes are inspected regularly and any problems corrected.
- Ensuring that correct procedures are used when working in link boxes to minimise risk of contamination of the oil.

Minor leakage from transformers due to aging of gasket materials is difficult to completely prevent.

Minor leakage does not constitute a failure of the transformer and occur as transformer components naturally age during operation. The parts of the transformer that are prone to leaks are the main tank lid gasket, radiators, valves, and tap changer gaskets.

3.3.1 Alternatives to Gaskets

Welding joints and minimising the number of hatches on a new transformer will reduce leaks. However, this needs to be balanced with issues later in the transformers life when it becomes necessary to complete inspection and maintenance tasks.

The recent and ongoing capital program has replaced a significant percentage of older transformers. This has consequently reduced the occurrence of leaks. In extreme cases welding of the transformer lids has also been completed on occasions where specifics of the transformer allowed.

3.4 Ausgrid's Oil Containment Systems

The purpose of an oil containment system is primarily to mitigate risk to the environment against a major failure. When designed, constructed and maintained correctly, the oil containment system mitigates risk exposure in three ways:

1. In major failures that involve fire it reduces the risk of prolonged fire (hence fire spread) by providing a quick draining route for oil, eliminating the fuel source.
2. In major failure it prevents large amounts of oil from entering stormwater drains and waterways by containing the full oil volume of the largest transformer on site.
3. It reduces the risk of oil mixed with water escaping the site when minor transformer leaks occur during normal operation by providing oil separation.

3.4.1 Zone and STS Substations

Oil containment is generally of five different types, each operating with a performance level depending on when the separator was installed. The typical performance of these is summarised in **Table 1**.

Table 1 Ausgrid Separator Systems (correct as of Jan 2013)

O/W Water Separators	Total in operation	Typical output performance
Enhanced Gravity Oil Water Separator (EGOWS)	70	<10mg/l
Plate Separators (PPS)	49	<10mg/l
Single Stage Separators, 2 Stage Separators	64	100mg/l
3 Stage Separators	13	100mg/l
None	14*	NA

Note: The limit of 10mg/l for the PPS technology is currently considered the lowest practicable working limit primarily due to emulsification of oil.

Note: Refer to **Section 4.3** for information on Ausgrid's Oil Containment Program

Note: Sites assessed within the Oil Containment Model with greater than 1000L oil filled equipment.

* Sites identified for decommissioning have been excluded from Ausgrid's Oil Containment Program. Alternate solutions will be investigated for these sites.

A summary of typical Ausgrid systems performances are as follows:

- Single stage separators (both circular and rectangular construction): During operation, oil and water discharge is not expected to achieve better than 100ppm. This is because a continuous flow system does not allow sufficient storage time to allow full oil & water separation. As a result, during rainfall, the system allows unseparated oil to be discharged, potentially even in minor rainfall events.
- Three stage separators: These work in much the same way as the single stage separator however, they may provide slightly longer travel paths and hence longer storage and separation times. Discharge is not expected to achieve results better than 100ppm (as they are generally similar in design to the American Petroleum Industry (API) tank criteria which achieves a discharge criteria of 100ppm).
- Enhanced Gravity Oil Water Separator (EGOWS): These are not a continuous flow system and hence the degree of separation is much greater, generally achieving less than 10 ppm for oils and greases. A residence time is achieved which is sufficient to attain these low levels of oil in the discharge. In major storm events, continuous flow could occur in the tank. This is considered statistically acceptable as for the majority of the time as the tank is not under continuous flow. See **section 4.3** for more information.
- Plate separator systems: Plate separators are capable of achieving discharge rates of up to 10 ppm for oils and greases. This oil containment system relies on containing oil within the bund during a major failure. See **section 4.3** for more information.

Sydney Water and similar water authorities do not generally permit stormwater to be discharged to sewer.

Water from the separators usually discharges on to the ground, eventually flowing to stormwater drainage. Oil separated from the discharge is contained in oil storage compartment, tank or drum (depending on the type of separator) for regular removal and disposal.

Each containment system must be designed to provide environmental protection given other site and installation constraints.

Ausgrid has assessed various oil separation facilities for their suitability. This review is summarised in **Appendix A**.

3.4.2 Distribution Substations

Distribution substations (kiosk and chamber style) designs incorporate basic containment options such as concrete tub style bases. Bunding for these transformers is designed to meet the requirements of AS2067, requiring oil containment for high voltage electrical equipment containing more than 500L.

The design is capable of containing the total volume of oil held within the equipment. This requirement is a standard requirement for new style distribution substations. Older style distribution substations with no oil containment are upgraded as part of Ausgrid's replacement programme or retired at their decommissioning.

Where no oil containment system is used (volumes under AS2067), for example, pole top distribution transformers, the immediate response to an incident must be safety and then containment of spill.

3.4.3 Deluge Systems

Critical indoor substations are protected by automatic file sprinklers systems which are designed to discharge water (50-90 L/s) during a transformer fire. The containment systems at CBD substations do not have sufficient capacity to contain this water for more than a few minutes. A progressive upgrade of CBD substations is addressing issues associated with containment of water from the automatic fire systems.

New substations that incorporate a deluge system are generally designed to hold 90mins of deluge water.

3.4.4 Stormwater Inflow

The catchment size is a critical factor in reducing the physical requirements and/or improving the performance of any separator system.

One option for reducing the catchment size is the installation of roofed areas. Roofs can be installed over the transformers and possibly the transformer roadway, drainage lines and an oil containment tank to retain oil lost through normal operation and through major failure. Unfortunately, this option is not available in most cases as there are live electrical busbars and equipment located above the transformers.

4 Management Strategies

4.1 Risk Assessment

Ausgrid has adopted a risk-based approach to oil containment.

The purpose of an oil containment system is to mitigate risk to the environment against a major failure and provide a safer work area for operation and maintenance on electrical equipment. When designed, constructed and maintained correctly, the oil containment system mitigates risk exposure in three ways:

- In major failures involving a fire it reduces the risk of prolonged fire (hence fire spread) by providing a quick draining route for oil, minimising the fuel source.
- In major failure, it prevents large amounts of oil from entering stormwater drains or waterways by containing the full oil volume of the largest transformer on site.
- It reduces the risk of oil mixed with water escaping the site when transformers have minor leaks during normal operation by providing oil separation.

4.2 Siting Selection

The location of oil filled equipment has an influence on the risks associated with the facility.

In conjunction with other criteria including an environmental impact assessment in accordance with the *Environmental Planning and Assessment Act 1979*, environmental risk assessments will consider and address:

- Site conditions such as topography, usage of adjoining areas, or the risk of natural disasters, e.g. flood, earthquake, lightning strikes;
- Heat, corrosion, or environmental damage by the liquid being handled;
- Design of plant, equipment, and operating methods, so as to minimize fire and accident risks;
- Specific design for emergencies particularly fire fighting facilities;
- Safe access to and egress from all working locations;
- Avoidance of ignition sources (exemptions apply in AS1940 for equipment in service);
- Spill control measures to avoid contamination of soil and water;
- Location of protected places, such as dwellings, place of worship, public building, schools or colleges, a factory, workshop, office, store, warehouse, shop, a ship lying at permanent berthing facilities, etc;
- Location of drains, waterways, etc;
- Location of protected fauna and flora.

4.3 Ausgrid's Oil Containment Program

Ausgrid has an Oil Containment Program which focused on mitigating the environmental risk at both new and old sub-transmission and zone substations sites.

4.3.1 New sites

The type of system usually installed at Ausgrid's new sub-transmission and zone substations are Parallel Plate Separators (PPS) or the Enhanced Gravity Oil Water Separator (EGOWS).

See **section 3.4** for more information.

The key design goals for new sites is to meet the discharge criteria of no visible oil during day-to-day operations and to contain the oil in the event of a major failure. This practicality corresponds to the following criteria:

- Suspended Solids: 50 mg/L
- Total Oil and Grease: 10 mg/L (based on Australian Water Quality guidelines and assumption that at this level no film is visible)
- pH: 6.5 - 8.5
- EGOWS capacity: Tank capacity = 110% of the volume of the largest transformer
- PPS capacity: Bund capacity = volume of the largest transformer plus 20mins fire fighting capacity (generally 5,000L)

Generally additional capacity will be provided with overflows to neighbouring bunds.

Oil can combine in a dissolved or emulsified form in water at rates up to 10 ppm as a result of travelling down a drain pipe. Emulsification increases with turbulence. Dissolved and emulsified oil cannot be separated by separation systems that rely solely on gravity for separation.

Operation of oil containment systems should be automatic and safe to operate and maintain.

The location and access to shut off valves and containment equipment is designed to ensure safety is not compromised in operation, particularly when operation may be necessary in low light conditions, in poor weather and during fire and spill incidents.

4.3.2 Existing sites

Ausgrid conducted a risk assessment study of 96 sub-transmission and zone substations sites in 2004 where oil containment facilities did not comply with current standards, to determine the likelihood of the failure of oil-filled equipment and the consequences of such a failure at each site, based on the volume of oil and its proximity to sensitive environmental areas.

Ausgrid plans to implement or remediate oil containment systems at each of the 96 sites assessed over a five year period. Oil containment enhancement work has already been completed at the majority of the 96 identified sites. There are 25 sites remaining which require work. These sites are separated into 2 groups;

- zone substations which currently have no oil separation will be fitted with Parallel Plate Separators and increased size bunds (PPS solution). 5 sites identified on the original list for the PPS solution were removed or placed on hold as the site has or will be retired.
- zone substations with existing discharge tanks will be fitted with flame traps, new gravel and increased size bunds. There are 27 sites remaining for this solution with work at some sites on hold as the site is due for retirement.

The total cost of installing PPS oil containment at sites with no oil containment over the five year period is $10.4M (2009-14 AER regulatory period).

The total cost of upgrading existing sites with flame traps, new gravel and increased bund size is $14.5M (2009-14 AER regulatory period). Some substation sites currently earmarked for this option may require the PPS system to be implemented instead, if the existing tank or its piping is found to be deteriorated or is damaged beyond economic repair.

A second stage of work has been approved to improve the oil containment across Ausgrid's sub-transmission substations. These works have been identified to address the risks associated with larger oil volumes, increased catchment areas, brick bunded and long underground pipe runs.

19 sites have been identified on this programme and the works include upgrades to; inadequate brick bunding, oil water separators and damaged pit and pipework at sub-transmission substations.

The total cost of the stage two works at the Sub-transmission substations is $10.8M and is expected to be completed by the end of 2015.

4.4 Maintenance and Monitoring of equipment

Ausgrid's transformer maintenance is undertaken in accordance with Ausgrid's *Network Technical Maintenance Plan for major substations*. This program involves planned 6 monthly checks for transformer gasket leaks, leaks around the drain cocks and checking oil levels on all gauges. Further checks are carried out at varying intervals and include thermal indicator checks, oil tests and corrosion checks. There are also ad hoc inspections and monthly security inspections at zone and STS substations that would identify oil leaks on other equipment.

All sub-transmission and zone substations transformers have a low oil alarm on equipment that is reported back to the system control centre. The System Control Centre is continuously manned. In the event of a major failure, the System Control Centre will be alerted immediately (either by electrical protection systems and/or oil monitoring systems).

Alarm systems incorporated into PPS oil water separators are specified for oil containment systems. The oil separator system shuts down in the event of a major oil incident and/or once the oil tank is full.

Ausgrid is further developing an oil leak database for use by transformer maintenance staff carrying out inspections. Leaks are prioritised based on a visual inspection. Repair of leaks may require the transformer to be off-line for a period while maintenance is carried out.

Occasionally, transformer leaks can be stopped by re-tightening the lid bolts to address gasket shrinkage. On other occasions the complete replacement of gaskets may be necessary. This work is based on a condition assessment and cost/benefit analysis. Costs for gasket replacement in sub-transmission and zone transformers are typically around $150,000 per transformer. Changing gaskets typically takes 10 working days, with the transformer out of service for this period.

4.5 Maintenance of oil containment systems

Maintenance of oil containment systems includes the inspection, cleaning and maintenance of transformer bunds, flame traps, pipes and oil containment tank, as applicable. The maintenance requirements for oil containment systems are outlined in the Network Standards *NS190 - Oil Containment Operational Requirements for Major Substations* and further detailed in the Network Technical Maintenance Plans *SU0115* and *SU0116* and instructions are.

Information such as type of oil containment systems and PCB concentration of oil from last testing are stored within Ausgrid's Integrated Asset Management System.

Ausgrid externally contract out the waste disposal requirements to appropriately trained and licensed waste contractors.

4.6 Sites to be decommissioned

Sites with no oil containment were identified in Ausgrid's oil containment programme which are either in the process of being decommissioned or programmed for replacement in the near future. These sites have been excluded from the upgrade programme as the works is likely to be commenced after the site has been decommissioned.

Each site will be assessed on an individual basis and where deemed necessary, interim controls will be implemented. These controls will be temporary in nature and may not meet the full requirements of Ausgrid's current Network Standards.

4.7 Noisy transformer replacement

Customer complaints regarding transformers are largely due to inappropriate developments and encroachments adjacent to Ausgrid zone substations. Nevertheless Ausgrid will aim to address noise complaints using reasonable and practicable methods as part of the Duty of Care Program. In limited cases this involves replacement of the transformer ahead of schedule where other factors such as condition would otherwise warrant the replacement.

The early replacement of these transformers has consequently reduced the occurrence and risk of leaks.

4.8 Spill Response, Training and Awareness

Spill kits are available at all major substations to attend to minor spills.

Emergency drainage plans are prepared for all STS and zone substations. The plans include details on oil containment such as onsite bunding, drainage flow paths, containment volumes and any emergency shut-off valves.

Ausgrid's environmental guideline *EG 100 Oil Handling and Spill Response* details response procedures to be followed in the event of an oil spill. The procedures cover the application of oil response kits, spill response trailers, oil tankers, reporting and product use. Transformer maintenance staff are trained in the application of these guidelines. Additionally, all large substations have emergency contact numbers which include an internal 24hr call-out number to phone in the event of an oil spill. Supporting this system is general environmental awareness training for all staff, Ausgrid's incident reporting and recording system and specialist Environmental Services group.

4.9 Environment Management System

Ausgrid is committed to conducting business without environmental harm, by protecting the environment and ensuring sustainable development.

Ausgrid has an overarching Environmental Management System Environmental Management System and includes environmental policies and a number of associated procedures. The Environmental Management System is certified to the Australian and International Standard AS/NZS ISO 14001:2004.

Ausgrid undertakes an annual environmental risk assessment to identify, evaluate for significance, monitor and communicate the environmental impacts, aspects and risks of our activities. This process also establishes and maintains environmental objectives and targets in line with continuous improvement.

Opportunities for improvements to the Environmental Management System will be programmed through the Environment Improvement Plan (EIP) which is reviewed annually via the environment risk assessment process. Ausgrid's Environmental Scorecard outlines key performance indicators for a financial year.

Ausgrid's Network Standards detail the construction, maintenance and monitoring requirements of equipment and containment systems.

Ausgrid's Environmental Guidelines detail response procedures to be followed in the event of an oil spill.

Regular review and updating of documentation is part of this strategy to ensure that Ausgrid's oil filled equipment management have the lowest practical risks.

5 Environmental Management Plan

Ausgrid is committed to minimising the environmental risk associated with oil filled equipment. As such Ausgrid has implemented a number of measures described in this plan which are aimed at effectively managing this environmental risk.

Key measures include:

- The use of risk assessments for managing and prioritising risks associated with oil filled equipment
- The use of EGOWS or PPS systems for all new sub-transmission and zone substations sites as a minimum standard
- A commitment to upgrade all zone substations sites with no oil containment to sites with PPS systems within 5 years at an estimated cost of $11M (2009-14 regulatory period)
- A commitment to upgrade all zone substations sites with inadequate bunds with flame traps, new gravel and increased bund size within 5 years at an estimated cost of $15M (2009-14 regulatory period)
- A commitment to upgrade all sub-transmission substations with inadequate brick bunding, oil water separators and damaged pit and pipework by the end of 2015 at an estimated cost of $11M
- The removal of all Scheduled PCBs from existing sub-transmission and zone substation transformers
- A commitment to phase out and manage all other PCBs on the network in accordance with Ausgrid's PCB licence
- Ongoing maintenance, monitoring of equipment and containment facilities
- Training and awareness in spill response and preparedness
- A commitment to adopt proven technologies that improve performance as soon as practicable
- A commitment to report against, review and update this plan on an annual basis.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **1. Major failure of sub-transmission and zone transformers**						
Reduce the likelihood of major failure.	No major failures.	**1.1** Transformer maintenance program.	**1.1.1** Maintenance is done according to Network Technical Maintenance Plan.	Network Operations	Ongoing	Ongoing
Aspect **2. Leaks in sub-transmission and zone transformers**						
Reduce the likelihood of oil leaks on the Environment.	Transformers adequately maintained, and leaks minimised	**2.1** Transformer maintenance program.	**2.1.1** Maintenance is done according to Network Technical Maintenance Plan.	Transmission Substation & Services	Ongoing	Ongoing
		2.2 Improve reporting methods.	**2.2.1** Development of a reporting procedure within SAP.	Maintenance & Replacement Planning, Environmental Services, Network Operations	Improved level of reporting for oil leaks within SAP.	Ongoing
		2.3 Transformer repair/refurbishment and replacement program.	**2.3.1** Major transformer leaks are considered in the transformer repair/refurbishment program.	Maintenance and Replacement Planning	Ongoing	Ongoing
Aspect **3. Containment in sub-transmission and zone substations**						
To reduce the risk to the environment given that oil is lost from a transformer tank (major failure).	Containment systems exist at all sub-transmission and zone substations effective at managing major oil loss	**3.1** Containment System Installation Program.	**3.1.1** Complete 26 sites with parallel plate separators systems by 2013/2014 in accordance with AG Duty of Care Plan April 2008.	Design & Engineering Services - Development Services , Projects – Civil Construction	Option D-5 Complete D-5 Construction Program in accordance with Duty of Care Plan April 2008.	No Action nominated.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
			3.1.2 Complete 54 site bund upgrades by 2013/2014 in accordance with AG Duty of Care Plan April 2008.	Design & Engineering Services - Development Services , Projects – Civil Construction	Option X construction at 13 sites subject to Safety Observer availability.	Complete Option X Construction Program in accordance with Duty of Care Plan April 2008. Subject to Safety Observer availability.
			3.1.3 Install EGOWS/PPS systems at all new Zone substations.	Network Operations	Ongoing	Ongoing
			3.1.4 Complete oil containment upgrades at 19 STS sites in accordance with Sub-Transmission Oil Discharge Compliance report.	Major Projects Network Development	Project funding approved and project development.	Project completion by end of 2015
		3.2 Update priority list of substations for oil containment.	**3.2.1** Review priority list on the risk assessment model.	Environmental Services	Update oil containment model with X and D-5 works.	Ongoing
		3.3 Investigate improvements to existing systems	**3.3.1** Develop strategy to address high priority issues associated STS sites.	Network Operations Projects – Civil Construction	Achieved	Achieved
			3.3.2 Develop strategy to address high priority issues at Zone sites.	Network Operations Projects – Civil Construction	Prepare project proposal to address high priority issues at Zone sites for AER regulatory submission.	Works in accordance with AER regulatory approval.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **4. Maintenance of sub-transmission and zone substation oil containment systems**						
Optimise the operation of existing oil containment systems.	Knowledge of containment system performance.	**4.1** Containment system inspection program.	**4.1.1**. Inspections on oil containment systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
		4.2 Maintaining oil containment systems	**4.2.2** Maintenance for parallel plate separator systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
			4.2.3 Maintenance for single stage, triple stage and EGOWS systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
			4.2.4 Complete a review of Oil Containment maintenance activities.	Aqueous Waste Services Group, Environmental Services	Prepare updated procedure for the maintenance of oil containment systems.	No Action nominated.
		4.3 Develop trend analysis data from program of pumping oil from containment tanks.	**4.3.1** Data capture for trend analysis in SAP.	Aqueous Waste Services Group	Ongoing	Ongoing
		4.3 Develop trend analysis data from program of pumping oil from containment tanks.	**4.3.2** Prepare report on trend analysis on oil pumping/collection data from oil containment tanks.	Environmental Services	Preparation of report.	No Action nominated.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
		4.4 Investigate improvements to existing containment systems	**4.4.1** Investigate and report on substations with unnecessary high stormwater inflows from yard drainage. Investigate the issues associated with GRC pits and other oil containment system components as required.	Design & Engineering Services - Development Services	Work in accordance with NIG12501 and finalise NIG12500.	Works in accordance with NIG12500 and NIG12501 for Oil Discharge Compliance at STS and Zone sites subject to Safety Observer availability.
Aspect **5. PCB in the Environment**						
Reduce the risk to the environment from PCBs	To manage oil with PCB in accordance with PCB Plan.	**5.1** Ausgrid's EMS410 PCB Management Strategy.	**5.1.1** Comply with PCB Chemical Control Order, Ausgrid's PCB license conditions & Ausgrid's PCB Management Strategy.	Network Operations	Ongoing	Ongoing
Aspect **6. Spill Response**						
Reduce the risk to the environment given a major failure of a transformer tank, leak and/or failure of the containment system.	All staff able to implement appropriate spill response procedures.	**6.1** Ausgrid's ET008 Oil Handling Training Program.	**6.1.1** All relevant work groups be trained in accordance with Ausgrid Environmental Training Program.	Network Operations Health Safety and Environment Environmental Services	Ongoing	Ongoing
		6.2 Emergency drainage plans for Zone and STS sites.	**6.2.1** Emergency drainage plans available and current at all Zone and STS sites.	Design & Engineering Services - Development Services	Ongoing	Ongoing

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **7. Distribution Substations**						
Reduce the risk to the environment given a major failure of a transformer tank or leak.	No material oil impact to the environment.	**7.1** Oil containment design advice for distribution substations prepared. Appropriate Network Standards upgraded as required.	**7.1.1** Investigate and report on risks posed by oil filled distribution equipment.	Environmental Services	Make recommendations based on preliminary investigations.	No action nominated.
		7.2 Oil containment provided in distribution substations.	**7.2.1** Distribution substation design meets oil containment requirements detailed in AS2067.	Design & Engineering Services - Development Services	Ongoing	Ongoing
Aspect **8. Benchmarking**						
To operate at industry best practice for the management of oil filled equipment.	To operate at or above industry best practice for the management of oil filled equipment.	**8.1** Benchmark oil containment requirements with other distribution utilities.	**8.1.1** Prepare benchmarking report to compare oil containment facilities across distribution utilities in NSW.	Design & Engineering Services - Development Services Environmental Services	Document strategies and performance by other agencies.	No action nominated.

6 References

- DECC Guideline - Bunding and spill management
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Volume1 (2000)
- AS 1940 The storage and handling of flammable and combustible liquids

Network Standards

- Ausgrid Network Management Plan
- Network Technical Maintenance Plan
- NS171 Firestopping in Substations
- NUS181 Approval of Materials and Equipment and Network Standard Variations
- NS186 Major Substations Civil Works Design Standard
- NS187 Passive Fire Mitigation Design of Substations
- NS189 Oil Containment for Major Substations
- NS190 Oil Containment Operational Requirements for Major Substations

Environmental Guidelines/Strategies

- EMS 410 PCB Management Strategy
- EG100 Oil Handling and Spill Response
- EG110 Transformer, Transformer Oil and Cable Oil Storage
- EG120 Waste Guidelines
- NUS174 Environmental Handbook
- ENVP01 Incident Response Procedure

Appendix A – Review of Oil Containment Systems/Separators

Appendix A - Review of Oil Containment Systems/Separators

1. Roofed Bunded Storage

Impervious roofed bunded storage areas designed to comply with AS1940 and DECC Bunding and Spill Management Guideline prevents discharge to the environment. Liquids collected in the sump or bund requires removal by liquid waste tanker to lawful disposal facilities.

Unfortunately, this option is not available in most cases as there are live electrical busbars and equipment located above ground. Nevertheless, the option is taken into account for all installations.

2. Open Bunded Storage

Where open bunded storage areas are used, rainwater captured in the bund must be managed to ensure the containment systems is not overtopped and oil is lost and to provide safe access to the contained area.

Ausgrid has assessed various oil water separators for their suitability.

One constraint on Ausgrid's choice of oil water separator is the large number of substations requiring oil containment.

The criteria used in assessing the available equipment are:

- Preference for a passive system - that is, one that does not require operator attention. This was to accommodate the large number of installations required by Ausgrid.
- A low maintenance system - systems that require manual pumping were regarded unfavourably.
- The ability of the system to meet the water quality objectives for visual amenity as defined by the Water Quality and River Flow Interim Environmental Objectives: Sydney Harbour and Parramatta River Catchment (October 1999) published by the DECC for NSW Government.
- The ability of the system to comply with other relevant guidelines and standards, including Australian Standards.
- Lowest life cycle cost of the requirement to install effective oil containment at over 200 substations precludes the use of overly expensive facilities.
- Size many substations are constrained by the land available for the construction of oil containment facilities, e.g. 20 metre long oil interception tanks. The head of water available also restricts the suitable construction area at many sites.

Various forms of water treatment systems for oil containment were reviewed are detailed below.

3. Gravity Separators

Gravity separators rely on the density differential between oil and water. Transformer oil has a relative density of 0.87 to 0.88, and rises to the surface under gravity in a suspension with water.

Single Stage Oil Water Separator and Triple Stage Oil Water Separator

These systems were historically installed into oil storage areas where roofing was not practical from access or because of electrical safety clearance and heat limitations. These systems were designed to meet the relevant standards at the time of installation

Water discharged through these systems relies on different density or specific gravity of oil water. Longer 'resident time'[3] (larger storage volumes improve the separation of the oil from the water.

Single stage separators (both circular and rectangular construction): During normal operation, oil and water discharge is not expected to achieve better than 100ppm. This is because a continuous

[3] *Resident time* is the theoretical time for a particle of water to travel through the separator. Calculate by dividing available storage (in L) by the design flow rate (in L/s).

flow system does not allow sufficient storage time to facilitate oil & water separation. As a result, during rainfall, the system allows unseparated oil to be discharged, potentially even in minor rainfall events.

Triple stage oil water separators have 3 chambers which ensures the flow path is not 'short circuited' hydraulically, but otherwise perform in the same manner. They may provide slightly longer travel paths and hence longer storage times. Discharge is not however expected to achieve results better than 100ppm.

Drainage from the bunds is directed to the oil water separator. Areas not required to be bunded should be drained directly to the stormwater system to ensure the separator is not hydraulically overloaded.

American Petroleum Institute Separator

The simplest oil water separation method is to detain the oily water in a low velocity (or zero velocity) environment for a sufficient time to allow the oil to float to the surface, and then to release the oil free water as underflow. The API Separator was designed to treat oily wastewaters from oil refineries. There is a marked difference in the application of API separators between refineries and substations. The API separator is designed to remove gross quantities of oil from refineries before further treatment of the water and re use of the oil.

Most oil water separators installed at Ausgrid substations are based upon the API separator design. Previous testing of an existing single stage separator installation at Kirrawee found that residence times (about 20 minutes) were too short to enable effective oil water separation. The oil water separator installed at Kirrawee conformed closely with guidelines for API separators.

Advantages

1. Low maintenance costs. Expected maintenance period would be every second year, to clean sludge from the bottom of the tank and remove oil from the top.

2. There are no mechanical moving parts such as pumps and actuator valves. Any such parts would require operation every two weeks to avoid seizing of the units.

Disadvantages

1. High capital costs, tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment (as required by Australian Standards). However, this criterion is applicable to all oil containment equipment. The geometry of the tank, and hence costs will be determined by the largest expected flow rate.

2. The effluent from an API separator is not expected to achieve better than 100ppm. This is above the EPA recommended guideline.

3. The effluent quality is expected to be worse if design flow rates are exceeded. Large surges in flow to an API separator can disrupt its performance, even if only for short periods of time (e.g. major stormwater runoff). To control separator inflow at a steady rate (at or below design inflow) is feasible, but requires containment or bypassing of the surplus water, at additional capital cost.

4. A risk of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the large inflow of oil.

Drainage Holding Sumps

These are simple storages for small volumes of oily water that permit batch treatment, or extended oil separation time. Drainage holding sumps can be used as collection and separation tanks that catch the wastewater and store it for a specified period. The system requires an automatic or manually activated pump system to operate as the tank approaches capacity. An automatic pump can reduce the flows expected in the tank and hence increase detention time in the tank. The system would also require an oil detection probe to trigger pump operation.

Advantages

1. Such a system would be capable of achieving the EPA recommended guideline of 10ppm by providing increased residence times.

Disadvantages

1. The intermittent nature of oily water inflow from substations complicates the installation of drainage holding sumps at Ausgrid. Ausgrid are cautious about using pumps as part of their wastewater treatment system, as reliability can be reduced and maintenance requirements could be high.

2. Prolonged fire as there is no drainage of the fuel source.

4. Oil Coalescers

Oil Coalescers provide a shorter path for oil droplets to travel before they reach an oily surface on or with which they can coalesce.

Parallel Plate (Coalescing Plate) Oil Water Separator

This system is installed where roofing is not practical because of access restrictions for loading or because of electrical safety clearance and heat limitations. Water is discharged through oil water separators containing a coalescing plate. The coalescing plate system requires less site area than EGOWS systems.

Aboveground separators rely on pumps and float controls to maintain storage areas in a dry condition.

Areas not required to be bunded should be drained directly to the stormwater system to ensure the bunds do not overflow and the oil water separator is not hydraulically overloaded.

Plate separators systems: Plate separators are capable of providing discharge rates of 10 ppm for oils and greases. This oil containment system relies on containing oil within the bund during a major failure.

Because the discharge from separators drains to stormwater, separators must be selected to ensure water quality discharge is achieved, oil is contained and the system shuts down in the event of a major oil spill, with appropriate alarms installed so that bunded storage can be maintained before oil discharges to the environment. Parallel plate separators designed to discharge water to sewer are not typically suitable for this application.

These devices generally consist of a series of parallel, corrugated plates placed in line with the oily water flow through a chamber. The plates are frequently angled up and may be semi folded. They rely also on the tendency of oil droplets to rise in water but have the advantage that the oil droplets need only rise (at most) a height equal to the distance between the plates. Thereafter, the oil progresses upwards along the surface of the plate and finally as an accumulation of small drops. The accumulation of small drops leaves the plate as one larger drop and rises to the surface.

Advantages

1. The advantage of oil coalescers is that they are generally more compact than the API type separators. Parallel plate coalescers however, have greater maintenance requirements.

2. Manufacturers report that Parallel plate coalescers are capable of achieving 10 ppm effluent oil content. For large flow rates, this substantially increases the size of the coalescing plate pack. In the absence of data on inflow oil globule size distribution, supplier claims for less than 10 mg/L oil in separator effluent cannot be tested.

Disadvantages

1. Plate coalesers are designed to separate oil droplets larger than 60 microns. If above design oily water flows are experienced, oil can be re entrained by turbulent flow in the narrow channels between the plates. The cross flow design is intended to minimise this problem.

2. High maintenance costs, the plate pack must be cleaned frequently. Maintenance would require emptying of the tank and disposal of oil by an approved method.

3. The plate packs are generally made from polyurethane. In the event of a major failure, hot oil (160° Celsius) could melt and destroy the plate packs.

4. High capital costs, the tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment. However, this criterion is applicable to all oil containment equipment.

5. There is a possibility of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the oil.

Flow Restriction/Impact Coalescers

These include fibre mats, filters, and membranes, through which the oily water flows. The oil droplets are forced to impact on oily surfaces and other droplets, and coalesce with them. A head loss is incurred, which requires a pumping system and operator attention.

Filter systems can remove oil droplets down to 5 microns, but can easily be blocked by solids in the oily water.

5. Centrifugal Separators

Centrifugal separators (vortex or cyclone type) increase the 'gravity' forces, and can separate oil from water provided enough head is available. However, centrifugal separators cannot be regarded as passive systems. These separators are used mainly in offshore situations, e.g. ships, oil production platforms, and have high energy and maintenance requirements.

6. Proprietary Stormwater Drainage Systems E.G. Humeceptor (Stormceptor)

This is a low energy devices are designed to remove oil and settleable sediment from stormwater flows by principles similar to the API separator. Humeceptors are circular in plan and have a baffle system to help direct flow. The Humeceptor is divided into two sections, the treatment chamber and the bypass chamber. The treatment chamber is a circular chamber designed to separate oil and sediment at the design flow rate. The flow is directed into the chamber by an inlet pipe that is laid horizontally and is directed around the circumference of the chamber. The direction of the inlet pipe is critical in preventing short circuiting and turbulence in the system.

Advantages

1. The treatment system will be bypassed when flow rates are in excess of the design flow rate, thus eliminating resuspension of oil and sediment in the treatment chamber.

2. Provides quick drainage for oil.

Disadvantages

1. The Humeceptor is designed to treat non point source pollution from urban runoff. The design of the system is based on the assumption that the contaminants are contained in the first flush of rainfall. This assumption has not been proven true for applications such as Ausgrid's.

2. At flows greater than the design flow, the stormwater bypasses the treatment chamber and is directed over the inlet weir. Large flows move directly through the Humeceptor system without any treatment.

3. The largest of the Humeceptor tanks is only capable of containing 4290 litres of oil. This is well below the average volume of oil in Ausgrid transformers. This treatment unit would need to be used in conjunction with a cut off valve at the bunded area, or an additional tank capable of containing the total volume of oil in the largest transformer.

7. Flotation Separators

These apply pressure to the oily water using dissolved air or other gases. On release of the pressure, small bubbles are formed that attach to oil droplets and increase their buoyancy, taking them to the surface with increased velocity. This is called Dissolved Air Flotation (DAF) and is widely used in the separation of particulate solids from liquids. Dissolved Air Flotation is widely used for sludge treatment in Wastewater Treatment Plants. In an alternative concept, Induced Air Flotation, air is drawn into the oily water stream as fine bubbles.

These flotation methods can remove 5-micron oil droplets from suspension and are used mainly for secondary water treatment. Their operation requires pressurised conditions, and operator attention.

8. EGOWS Separator Design

Ausgrid in conjunction with the University of New South Wales has developed a world leading and innovative oil/sediment/water separation system patented in Australia, New Zealand, USA and Europe, known as the Enhanced Gravity Oil Water Separator (EGOWS). The design achieves lower oil levels in effluent than do the API Separator (API) and Parallel Plate Separators (PPS). This is because the API and PPS operate with a full vessel of water and thus short-circuiting of inlet oily water to the outlet cannot be completely prevented.

The review of available equipment highlighted two important parameters for effective oil water separation:

Residence Time - increased residence times allows for time for smaller oil droplets (which rise with lower velocities) to rise to the surface; and

Quiescent Conditions - a low (or zero) velocity environment, free from turbulence is ideal. High velocities and turbulence are not conducive to the separation of oil from water.

The EGOWS Oil Water Separator was designed to provide increased residence times within the tank. Increased residence times allows for more effective gravity separation of oil from water. The design takes advantage of the need for the separator to contain the oil spilled in the event of major failure of the largest transformer on site. The EGOWS separator design provides a potential oil storage volume and does not always operate full of water, unlike traditional gravity separators. The design thereby provides storage capacity for at least the `first flush' of oily water influent, and in most cases the total runoff from a site during a rainfall event.

The design is based on the API separator, and includes an automatic siphon that releases water from the otherwise standard separator and so creates a potential storage for a specified volume of oil water mixture.

The volume within the tank operating range is progressively filled with the oil water mixture from successive rainfall events or from a major oil spillage. Until this volume is accumulated, oil droplets can rise through and separate from the water over a much longer period than the residence time available in the standard through-flow separator. The main chamber is quiescent with virtually zero turbulence except during inflow periods and at the end of each cycle when the siphon is operating (which will induce negligible turbulence).

EGOWS tanks are a non continuous flow system and hence the degree of separation is much greater, generally achieving less than 10 ppm for oils and greases. A residence time of 3 days (on average) is achieved which is sufficient to attain these low levels of oil in the discharge. In major storm events, continuous flow will occur in the tank. This is considered statistically acceptable as for the majority of the time as the tank is not under continuous flow.

Operating Principle of the EGOWS Separator

Stage I: Tank Empty - After installation, the empty tank will be filled with clean water above the skimmer level. At this time, the tank is ready for operation.

Stage 2: Inflow and Separation - An initial storm event leads to an inflow of oil-water mixture. During this inflow period, oil water separation also occurs. No outflow occurs in this period, as the water level is below the siphon crest level.

Stage 3: Separation - During this time between storm events, no outflow occurs. Successive storm events add to the oil water content of the tank. Oil water separation occurs throughout this period.

Numerical modelling (based on real rainfall data) for 1996 shows that stage 3 separation can last for up to 8 weeks.

Stage 4: Inflow/Separation and Outflow - During the priming storm event, the tank fills up to (and over) the Siphon Crest Level. At this stage, the siphon will prime, and discharge oil free effluent. Clean water flows under the skimmer wall and is drawn by the siphon from between the skimmer wall and the end weir. The siphon empties the tank over 9 hours.

Stage 5: Tank empty - The tank is emptied by the siphon down to the siphon break level, and is ready for the next storm.

It is necessary to periodically remove oil from the surface of the tank. Allowing oil to accumulate to excessive levels in the tank will impede the effective operation of the tank. Manholes at the top of the tank provide access to the tank, allowing oil to be skimmed from the surface of the tank during maintenance.

Advantages

1. Because it holds the oily water in quiescent conditions for days, even weeks, before discharge, the EGOWS concept is capable of achieving the EPA recommended guideline level effluent specification of 10 ppm oil and grease.

2. The EGOWS separator is designed to gradually fill following successive storm events. The API separator (API) and the Parallel Plate Separator (PPS) operate with a vessel full of water. Short circuiting of oily water inflow to the outlet occurs in through flow separators, even at inflows below design.

3. In flow surges, as in a rainfall runoff event, both the API and EGOWS Separator are designed to fill under conditions of low turbulence (except adjacent to the inlet baffle), and with extended residence times.

4. If the inflow from a rainfall runoff event exceeds that required to prime the siphon, the separator water level will rise a further 70mm (750 L or 1.7 mm of rain) before water flows over the end weir. In this case, the EGOWS separator will be effectively operating as an API separator. Numerical modelling (based on real rainfall data) for 1996 shows that the end weir only operated on 2 occasions in 1996. Providing a higher end weir would prevent this from occurring, and ensure that the siphon is the only means of discharge from the tank.

5. The EGOWS separator is a flow retarding structure that prevents the rainfall runoff peak from overloading downstream drainage systems. Separators operating full of water pass on the peak flow almost immediately. The principle of holding back peak flows is economically attractive, and is increasingly employed in urban stormwater drainage systems.

Disadvantages

1. High capital costs, tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment. However, this criterion is applicable to all oil containment equipment.

2. Risk of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the oil. Given ideal conditions, a large volume of oil will displace the water in the interception tank, thereby preventing the loss of oil from the site. However, in reality, the development of flow surges and short-circuiting in the tank could lead to the escape of oil under the skimmer wall. This might occur if a very large volume of oil were spilt, e.g. a spill volume comparable to the capacity of the interception tank. This is a concern that is common to all oil interception tanks.

Appendix B – Major Transformer Failure Information

Appendix B - Major Transformer Failure Information

Transformer failures can be divided into two categories:

- Failure of the core and coils, or other components within the main tank of the transformer; and
- Failure of ancillary components (e.g. tap changers, bushings, cable boxes, link boxes etc).

1. Failures within the Transformer Tank.

Failures of the core and coils may result from poor design or manufacturing defects. Other defects may also occur in the transformer due to gradual deterioration over time. Oil samples are taken from transformers regularly, and assessment of transformers' condition is in part based upon analysis of these results.

Most failures within the main tank do not result in a fire as the fault is normally under the oil volume within the transformer tank. However, if the forces arising from the failure results in the transformer tank splitting, the combustible gases generated by the fault can mix with oxygen, and a major fire, fuelled by the volume of transformer oil, may result.

In situations where the operation of the transformer is critical, any unit that has reached the theoretical end of life, or that has other faults that cannot be economically repaired, should be replaced. However, it is Ausgrid's general policy to run transformers to end of life (supported by a suitable 'spares' pool).

2. Degradation of Paper Insulation

In older transformers, failures often result because the mechanical strength of the paper insulation due to aging is inadequate, and is unable to withstand the mechanical forces experienced within the transformer during through fault conditions. (i.e. a fault external to the transformer, that results in an increased current through the transformer).

The theoretical "End of Life" of a transformer, is usually defined as the point when the Degree of Polymerisation (DP) of the insulating paper falls below 200. At this point, it is unlikely that the transformer will survive a through fault. However, if the transformer is not subjected to any major through fault, it may continue to operate satisfactorily for many years.

Furans are a by-product of the degradation of the paper insulation within the transformer. Measurement of the furans in an oil sample gives an indication of the condition of the paper. Based on furan measurements some transformers on our system are probably at or near the theoretical end of life.

When the insulation in a transformer has degraded, it cannot be repaired or replaced. Replacement of the transformer windings is the only practicable solution to this problem. This is rarely economical for an old transformer.

3. Arcing, Overheating & Partial Discharges

Other faults within the transformer will generate gases that dissolve in the oil. Dissolved Gas Analysis (DGA) gives an indication of faults within a transformer. Some transformers on our system have DGA results indicating arcing, excess heating, or partial discharges within the main tank.

Faults within the transformer detected by Dissolved Gas Analysis, can occasionally be repaired on site, but often involve moving the transformer to a workshop for detanking and dismantling. This is rarely economical since there is no guarantee that the problem will be found and corrected.

4. Oil with Low Electric Strength

A transformer will only operate correctly if the insulating oil has adequate electrical insulating properties. Operation of the transformer cannot be guaranteed if the electric strength of the insulating oil falls below minimum standards. Electric Strength of Oil can be easily measured, and based on these measurements, some transformers on our system have oil with low electric strength.

The electric strength of the oil can easily be corrected by processing the oil through an oil treatment plant, to remove contaminants, particles and the excess moisture. However, most of the moisture within the transformer is contained within the insulating paper. Drying the oil removes only a very small amount of moisture from the transformer (approx 1%). When the dry oil is pumped back into the wet transformer, moisture is transferred from the paper to the oil, and within a short period (say 2 – 4 weeks) the oil will again be wet and the electric strength low. Hence repeated drying processes are required.

Drying the oil can be done either 'on-line' or 'off-line'. Ausgrid typically utilises 'on-line' methods as this has been shown more effective and lower cost.

5. Failure of Ancillary Components

Recent experiences within Ausgrid, as well as results of CIGRE surveys, indicates that most transformer problems result from failure of ancillary components.

Many of these failures involve the On Load Tap Changer, which is the only component of the transformer that involves moving parts. Failure of a tap changer often also results in a failure of the transformer windings, resulting in the transformer requiring major repair work or scrapping.

Other ancillary components include bushings, cable boxes, and link boxes. Recent incidents include:

- A shunt reactor at Mason Park was destroyed by a fire resulting from a bushing failure (circa 1995).
- The fire at Chatswood Zone in 1999 is believed to have resulted from a failure of the cable box.
- The fire at Paddington Zone in 2000 is believed to have resulted from a problem with the transformer's link box.

6. Tap Changers

Tap Changers are regularly maintained. Reliability Centred Maintenance studies have recently been carried out on the most common tap changers on the system to determine the most appropriate maintenance and maintenance intervals for these units. The outcome of this process is included in the Network Technical Maintenance Plan.

7. Bushings

High voltage condenser type bushings, with a testing tap (i.e. all 132 kV bushings and some 66 kV bushings) are tested during routine testing of transformers. Ausgrid has a bushing replacement program where defective bushings are identified and serviced. The replacement of oil impregnated bushing with resign impregnated bushings is being initiated to reduce risk.

Other bushings are not easily tested, and there is currently no test regime in place for these bushings. This is of particular concern for condenser bushings without a test tap. These are given a higher priority in the bushings replacement program.

8. Cable Boxes

Most cable boxes are oil or gel insulated. Historically most failures of the cable boxes were due to the ingress of moisture into the insulating oil/gel, or leakage of the oil or gel from the box, resulting in arcing and flashover from the bushings within the cable box. In addition, some oil insulated cable boxes are fitted with condenser type bushings. These cable boxes are at a greater risk of failure due to possible ingress of moisture into the condenser layers of the bushings.

Testing of the bushings within a cable box would be extremely difficult, and would best be suited to a workshop environment. Replacement of these bushings would also be difficult, but possible, if identical bushings were manufactured. Replacement or repair of the equipment is determined based on condition based assessment and cost/benefit analysis.

9. Link Boxes

Link box failures generally result from the ingress of moisture into the box. Link boxes may be frequently opened to allow testing of the transformer and associated cables. This leads to increased likelihood of contamination and moisture ingress.

Some link boxes contain barrier boards, which may absorb moisture, and lead to a major failure. Based on information available, all transformers with barrier boards used in their link boxes have been identified, the boards tested, and defective boards replaced where necessary. Ensuring that the transformer and link box oil is kept dry should reduce risk of failure of barrier boards.

Appendix C – Transformer Types, Sizes and Typical Quantities of Oil

Appendix C - Transformer Types, Sizes and Typical Quantities of Oil

Transformer type	Rating	Number of transformers	Typical quantity of oil / unit (L)	Estimated quantity of oil (kL)
Sub-transmission	19 MVA	3	15000	45
Sub-transmission	20 MVA	4	15000	60
Sub-transmission	30 MVA	6	15000	90
Sub-transmission	60 MVA	33	20000	660
Sub-transmission	80 MVA	1	30000	30
Sub-transmission	120 MVA	44	50000	2200
Zone 132/11kV	36 MVA	13	15000	195
Zone 132/11kV	38 MVA	33	15000	495
Zone 132/11kV	45 MVA	11	20000	220
Zone 132/11kV	48 MVA	16	20000	320
Zone 132/11kV	50 MVA	69	20000	1380
Zone 66/11kV	< 10 MVA	3	5000	15
Zone 66/11kV	13 MVA	2	10000	20
Zone 66/11kV	14 MVA	4	10000	40
Zone 66/11kV	15 MVA	3	1000	3
Zone 66/11kV	19 MVA	5	15000	75
Zone 66/11kV	20 MVA	1	15000	15
Zone 66/11kV	25 MVA	10	15000	150
Zone 66/11kV	33 MVA	19	15000	285
Zone 33/11kV	1 to 5 MVA	12	5000	60
Zone 33/11kV	6 to 10 MVA	9	5000	45
Zone 33/11kV	11 to 15 MVA	68	15000	1020
Zone 33/11kV	16 to 20 MVA	114	15000	1710
Zone 33/11kV	21 to 25 MVA	34	15000	510
Zone 33/11kV	26 to 30 MVA	11	15000	165
Zone 33/11kV	33 MVA	66	15000	990
Total		**594**		**10798**
Note: current June 2012, refer to SAP for current equipment quantities				

Transformer type	Rating	Number of transformers	Typical quantity of oil / unit (L)	Estimated quantity of oil (kL)
Distribution 12.7 kV pole	5 to 50 kVA	58	50	2.9
Distribution 11 kV 1 phase pole	1 to 65 kVA	1306	50	65.3
Distribution 11 kV 3 phase pole	1 to 75 kVA	6814	50	340.7
Distribution 11 kV 3 phase pole	100 to 160 kVA	1283	100	128.3
Distribution 11 kV 3 phase pole	200 to 250 kVA	2514	200	502.8
Distribution 11 kV 3 phase pole	300 to 375 kVA	1424	300	427.2
Distribution 11 kV 3 phase pole	400 kVA	2100	400	840
Distribution 11 kV 3 phase pole	500 kVA	17	500	8.5
Distribution 11 kV 3 phase pole	>500 kVA	1	500	0.5
Distribution 11 kV - Kiosk	15 to 160 kVA	225	100	22.5
Distribution 11 kV - Kiosk	200 to 250 kVA	72	200	14.4
Distribution 11 kV - Kiosk	300 to 380 kVA	711	300	213.3
Distribution 11 kV - Kiosk	400 kVA	3461	400	1384.4
Distribution 11 kV - Kiosk	500 to 550 kVA	835	500	417.5
Distribution 11 kV - Kiosk	600 kVA	2389	600	1433.4
Distribution 11 kV - Kiosk	750 kVA	1367	700	956.9
Distribution 11 kV - Kiosk	800 to 820 kVA	1222	800	977.6
Distribution 11 kV - Kiosk	1000 kVA	1129	1000	1129
Distribution 11 kV - Kiosk	1500 kVA	152	1500	228
Distribution - other enclosures	50 to 150 kVA	23	100	2.3
Distribution - other enclosures	200 to 250 kVA	253	200	50.6
Distribution - other enclosures	300 to 350 kVA	207	300	62.1
Distribution - other enclosures	400 to 475 kVA	291	400	116.4
Distribution - other enclosures	500 kVA	797	500	398.5
Distribution - other enclosures	600 kVA	12	600	7.2
Distribution - other enclosures	700 to 750 kVA	1109	700	776.3
Distribution - other enclosures	800 kVA	10	800	8
Distribution - other enclosures	950 kVA	3	900	2.7
Distribution - other enclosures	1000 kVA	1463	1000	1463
Distribution - other enclosures	1500 kVA	1313	1500	1969.5
Total		**32561**		**13949.8**
Note: current June 2012, refer to SAP for current equipment quantities				

Total Volume of Oil = 10,798 + 13,949.8 = 24,747.8 kL

Technical Documentation

Vegetation Management Services

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1 DEFINITIONS

Access Tracks: Tracks providing access to the off–road network assets of the Network Business. The nominated tracks pass over both private and public lands and are shown on the GIS mapping system.

Access Permit: The permit issued in compliance with the Network Business regulation, to allow work to be carried out where the work requires encroachment of nominated minimum safe working distances around the overhead electricity supply network

Aerial Bundled Cables (ABC): A covered multi–core aerial cable system, the conductors of which are closely bundled together. The system is used as an alternative to the open wired conductor system and permits a reduction in vegetation clearances.

Civil Works: Defined as a disturbance of soil levels involving hand tools or machinery and/or the import of material to correct erosion damage.

Consumer Mains: The mains from the Point of Attachment to the customer's premises.

Contract: As defined in the General Conditions of Contract (clause 6.1)

Contractor Personnel: As defined in the General Conditions of Contract (clause 1).

Declared Incident: Incident that cover major emergency situations such as storms, bushfires and major equipment failures that are determined by the delegated Representative(s) of the Network Business.

Discretionary services: Works that fall outside of the definition of Initial Cut and Vegetation Maintenance Services.

Distribution Mains: Any high or low voltage mains belonging to the Network Business, including those passing over public thoroughfares, an easement over public or private property, or passing over private property and which are electrically continuous between public thoroughfares, public land or Network Business easements.

Any span of low voltage mains on private property, attached at each end of the span to a Network Business high voltage pole.

Direct Services: Activities related to the delivery of the Contracted outcomes including Initial Cut, ongoing Vegetation Maintenance Services and non-programmed Discretionary services.

Easement Clearing: The action of removing all vegetation (to the nominated width) from electrical easements or corridors of varying dimensions for transmission, sub–transmission and distribution network voltages.

Electrical Safety Rules: The regulation prescribed by the Network Business for the manner in which work is carried out on or near the Network Business' electricity network and must be followed at all times.

Electrical Outage: the de-energisation of a section of the electrical network to allow work to be safely carried out on or near the network. To obtain an Electrical Outage the Electrical Safety Rules of each Network Business must be followed.

Emergency Work: Works for the purpose of maintaining or restoring infrastructure facilities or equipment in order to ensure public safety or to protect buildings or the environment due to a Declared Incident, including but not limited to:

- a sudden natural event, including a storm, flood, tree fall, bush fire, land slip or coastal inundation,
- an accident, equipment failure or structural collapse, or
- damage caused by vandalism or arson.

Environmental Incident: As defined in section 6.6.1.

HV CATT: An authorisation that allows vegetation control personnel to perform close approach tree trimming within 'exclusion zones' as defined by Network Business's safe approach distances outlined in their Electrical Safety Rules and other applicable documents.

This is not recognised as a national qualification or a unit of competence.

Indirect Services: Activities that support the delivery of Direct Services of this specification. This includes account management, complying with reporting requirements, invoicing and continuous improvement initiatives.

Initial Cut: All vegetation management activities within a Contract area where minimum clearances are not in place at the commencement of the Term in order to re-establish the Contract area for ongoing Vegetation Maintenance Services.

KPI: A Key Performance Indicator (KPI) is a measurement to evaluate the delivery of the activity prescribed in this Specification.

NSW Vegetation Management Common Requirement: As per Appendix K.

Overhead Electricity Network: Network Business owned overhead transmission and sub–transmission feeders, pilot cables and distribution Mains passing over either public or private property. Also including overhead streetlighting network, service mains to the private property boundary, support structures and attachments.

Performance Cycle: as defined in the General Conditions, (for the purposes of this Contract it is equivalent to the Cutting Cycle as defined in the VMCR).

Point of Attachment: The first attachment of the Service Mains to a support on the premises of the customer receiving supply, such as a pole or the customer's premises; or where there is one or more support structures on the customer's premises, the first support structure where the Service Mains pass over any private property before reaching the property of the customer receiving supply, the first structure on the first property closest to the point where the Service Mains connect to the Distribution Mains, unless there is a Network Business easement over the adjacent property, in which case the Point of Attachment will be at the first support structure outside the Network Business easement where there is a pole transformer on a customer's property, the attachment on the pole transformer of the low voltage mains supplying that customer's premises.

Rural area: Defined as per the *Urban Centres and Localities (UCL) dataset from Australian Bureau of Statistics.*

Services: is defined in the Part B General Conditions of Contract (clause 1).

Service Mains: Low voltage mains from the Distribution Mains to the Point of Attachment.

Term: As defined in the General Conditions of Contract (clause 1).

Trees: As defined in AS 4373 and includes palms.

Urban area: Defined as per the *Urban Centres and Localities (UCL) dataset from Australian Bureau of Statistics.*

Vegetation: All plant life including, but not limited to, trees, palms, vines, shrubs and grasses such as bamboo but not lawns. For the purpose of Access Track and Easement Clearing, grass over 1.5 metres tall will be included in the definition of vegetation and must be maintained.

Vegetation Management Common Requirement (VMCR): is the agreed minimum vegetation cutting requirement for the Network Businesses, Ausgrid, Endeavour Energy and Essential Energy.

Vegetation Maintenance Services: All ongoing vegetation management activities within a Contract area required to maintain clearances as specified in the Networks NSW Vegetation Management Common Requirement.

Vegetation Categories: Up to 1900 mm in circumference at 1 meter above groundline is categorised as follows:

i. Category 1: Unapproved and naturally propagated vegetation smaller than 3 metres and having a canopy less than 3 metres in maximum diameter or any vegetation having a trunk circumference of no more than 450 mm at a height of 1 metre from the groundline that has grown, or has the potential to grow, into clearance spaces. Category 1 vegetation is to be included in the provision of Direct Services,
ii. Category 2: Vegetation between 450 mm and 1250 mm in circumference at 1 metre above groundline
iii. Category 3: Vegetation between 1250 mm and 1550 mm in circumference at 1 metre above groundline
iv. Category 4: Vegetation between 1550 mm and 1900 mm in circumference at 1 metre above groundline

Water Crossing Signs: Signs adjacent to bodies of water warning of the presence of underground and overhead electricity power lines crossing the body of water that the Network Business is responsible for.

WHS Act: The Work Health and Safety Act 2011 (NSW). It can be found in http://www.legislation.nsw.gov.au/maintop/view/inforce/act+10+2011+cd+0+N

WHSMP: The Work Health and Safety Management Plan described in section 4.1.4 of this Specification.

WHS Regulation: The Work Health and Safety Regulation Act 2011 (NSW). It can be found in: http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+674+2011+cd+0+N

2 EXTENT OF THE SPECIFICATIONS

2.1 Objective of Services

This Specification covers the delivery of vegetation management services in proximity to Overhead Electricity Network assets, in proximity of Water Crossing Signs and around Access Tracks.

The objective of vegetation management is to:

a. mitigate as far as reasonably practical the potential risk to public safety,

b. mitigate as far as reasonably practical the instances of damage or interference with the Overhead Electricity Network, particularly during adverse weather conditions,

c. mitigate as far as reasonably practical the number of electricity supply interruptions caused by vegetation,

d. mitigate as far as reasonably practical the chance of contact between any person climbing any of the vegetation and the electrical conductors of the network,

e. establish and maintain access for asset maintenance purposes,

f. mitigate as far as reasonably practical the risk of fires caused by the contact between vegetation and the Overhead Electricity Network, and

g. mitigate as far as reasonably practical damage caused to overhead Network Assets by bushfires.

The Contractor is required to deliver Vegetation Maintenance Services to maintain clearances as specified in the Networks NSW Vegetation Management Common Requirement. In addition, Declared Incidents and other non- programmed Discretionary services have been included as part of this Specification.

2.2 Scope of Services

The scope of the Services covers the following activities:

2.2.1 Direct Services

2.2.1.1 Vegetation Maintenance Services

- Overhead Electricity Network.
  - Inspect and maintain the clearance of all vegetation from the Overhead Electricity Network and for service mains to the private property boundary, to the requirements of the VMCR and this Specification unless specifically detailed in Clause 9.1.1.2 or Appendix B.
- Easement Clearing and Access Track maintenance.
  - Inspection and maintenance of all nominated easements and Access Tracks per performance cycle.
- Water Crossing Signs.
  - Inspect and maintain the clearance of all vegetation from Water Crossing Signs to the requirements of this Specification.
- Clean up each worksite and dispose of all cut or surplus materials resulting from the services.
- Negotiate satisfactory access to private property for maintenance work requirements.
- Identification of vegetation defects on Service Mains between the property boundary and the point of attachment. Delivery of defect notifications to the

property owner/occupier and reporting to the Network Business.
- Provide dedicated Electrical Outage/HV CATT crews on a Vegetation Maintenance Area level.
- Self-Audit of Services.
- Clearance of vegetation defects identified by the Contractor or the Network Business according to the requirements of this Specification.
- Use the Network Business' computer system applications provided to schedule, record, interrogate, and update data.
- Use the Network Business' computer system applications as per clause 7.11.

2.2.1.2 Discretionary Services
- Emergency Work.
- Clear additional vegetation as nominated by the Network Business, where required.
- Negotiate the removal of vegetation as requested.

2.2.2 Indirect Services

2.2.2.1 Reporting of services performed

2.2.2.2 Reporting of KPIs (Direct Services, Indirect Services, WH&S and Environment)

2.2.2.3 Participation in quarterly reviews

2.2.2.4 Invoicing services

2.2.2.5 Continuous improvement initiatives

The Network Business reserves the right to add to, or withdraw work, from the Contract at any time during the course of the Term. No payments will be made against the withdrawn work where no actual works have been carried out.

2.3 Exclusion

Services below are out of scope:

a. Maintenance of clearances around Service Mains on private property.
b. Inspection and maintenance of clearances around:
    i. Consumer Mains,
    ii. Substations,
    iii. Assets owned by Transgrid, and
    iv. Privately owned equipment.
c. Grass cutting on easements (The Contractor is not required to cut grass where there is no Vegetation on easements).
d. Access Track installation and maintenance (major Civil Works).
e. Removal of existing rubbish.

3 GENERAL AND LEGISLATIVE REQUIREMENTS

3.1 Overview

a. In achieving the objective of the Contract, correct procedures and techniques must be adopted in order to:

   i. ensure safe work practices and a safe working environment,
   ii. minimise the number of complaints from the public and local authorities without compromising the objectives of the Contract,
   iii. reduce the scope for regrowth to be inside the minimum vegetation clearance, and
   iv. preserve the health and appearance of vegetation, in particular trees, as far as practicable.

b. The Contractor's procedures and techniques must allow for the:

   i. visualisation of the finished objective before trimming commences, and
   ii. estimation of growth rates and growth patterns in order to allow for regrowth.

c. Sound arboriculture techniques are to be used for the duration of the Contract. Amenity trees are to be generally trimmed to the requirements of Australian Standard (AS) 4373 – Pruning of Amenity Trees.

d. The Contractor must while providing the Services comply with the Network Business' permit for harm marine vegetation (mangroves) associated with trimming and clearing mangroves, to ensure safe clearance for powerlines and provide clear sight lines from the water and land for warning signs within the Network Business' operating area.

e. All trimmed vegetation, particularly trees, must be left in a safe and stable condition or, should a dispute arise, in a condition as directed by the Network Business.

3.2 Compliance with Statutory and Other Requirements

a. While delivering the Services the Contractor must comply at all times with all legislative requirements, environmental and occupational health and safety standards, the requirements of codes of practice, Australian Standards, industry standards and supplied information.

b. The Contractor must maintain a standard of work consistent with Industry Acceptable Standards, workmanship and safe practices.

c. Subject to clause 9.2 of the General Conditions of Contract, the Contractor is responsible for all costs associated with the Services including but not limited to the following:

   i. training,
   ii. obtaining any new qualifications for the Contractor or Contractor Personnel,
   iii. payments of fines from any regulatory bodies, and
   iv. equipment which may require updating or replacement due to regulatory changes or changes imposed by the Network Business.

d. Any fines or penalties levied on the Network Business as a result of the Contractor delivering the Services will be charged to the Contractor. Pursuant to clause 32.7 of the General Conditions of Contract, the Network Business reserves the right to deduct such monies from payments to the Contractor or from security monies.

e. All vegetation control works carried out in the vicinity of the Overhead Electricity Network must comply with the relevant policies and procedures of the Network Business.

3.3 Technical Standards

a. The Network Business will supply one copy of the relevant network standards to the Contractor. Wherever there is an omission or conflict in the Network Business Standard then the relevant legislation shall apply.

b. The Contractor can source the Network Business' network standards applicable to the Services from the Network Business' website at http://www.ausgrid.com.au/Common/Our-network/Standards-and-Guidelines/Network-standards.aspx.

c. The Contractor must ensure that it has in its possession and is working to the most up-to-date version of the relevant standards.

d. Contractors must register at https://www.ausgrid.com.au/Common/Our-network/Standards-and-Guidelines/Register-for-updates.aspx in order to receive any amendments to the relevant standards.

3.4 Legislation, Codes of Practice and Guides

The public documentation referred to below is for the Contractors information. This list is not exhaustive. It is the responsibility of the Contractor to understand, relay to and train their workforce in applicable legislative aspects and monitor changes to and updates of relevant legislation, codes of practice and guidance material.

i. National Electrical Network Safety Code, ESAA NENS 01-2001,
ii. Work Health & Safety Regulation 2011 (NSW),
iii. Work Health & Safety Act, 2011 (NSW),
iv. Protection of the Environment Operations Act 1997,
v. Protection of the Environment Legislation Amendment Act 2011,
vi. Protection of the Environment Operations (Waste) Regulation 2005 (Waste Regulation),
vii. Waste Avoidance and Resource Recovery Act 2001,
viii. Industry Safety Steering Committee (ISSC 3) - Network safety guideline for managing vegetation near powerlines,
ix. Electricity Supply Act 1995 No 94,
x. Electricity Supply (General) Regulation 2001,
xi. Electricity Supply (Safety and Network Management) Regulation 2008,Electricity Supply (Infrastructure Protection) Regulations (www.legislation.nsw.gov.au/sessionalview/sessional/sr/2010-331.pdf),
xii. Threatened Species Conservation Act 1995 No 101,
xiii. National Parks and Wildlife Act 1974 No 80,
xiv. Native Vegetation Act 2003 No 103,
xv. Noxious Weeds Act 1993 No 11,
xvi. Heritage Act 1977 No 136,
xvii. Local Government Act 1993 No 30,
xviii. Sydney Water Catchment Management Act 1998 No 171,
xix. Environment Protection and Biodiversity Conservation Act 1999,
xx. State Environmental Planning Policy (Infrastructure) 2007, and
xxi. Local Environment Plan for relevant LGA's.
xxii. Safe Work Australia - CONSTRUCTION WORK Code of Practice November 2013
xxiii. Safe Work Australia - General guide for working in the vicinity of overhead and underground electric lines
xxiv. Safe Work Australia - Tree trimming and removal work; crane access method. This document is currently in draft and under Safe Work Australia review. Once finalised it is the responsibility of the Contractor to integrate the document within their WHS management system, consult with and instruct their work force in the content and meaning of the document and implement

practical within their work practices

xxv. www.safeworkaustralia.gov.au/Legislation/model-COP/Pages/Model-COP.aspx

xxvi. NSW Waste Avoidance and Resource Recovery Strategy 2013–21

xxvii. www.epa.nsw.gov.au/warr/index.htm

xxviii. Environmental Planning and Assessment Act 1979 NSW

xxix.

3.5 Australian Standards

a. The Contractor is to source Australian Standards applicable to the services, codes of practice, NSW WorkCover documentation and the Electricity Supply (Infrastructure Protection) Regulation 2009. The Australian Standards are available from Standards Australia's website http://www.standards.org.au.

b. The Contractor must ensure that it has in its possession and is working to the most up-to-date version of the relevant AS/NZ standards and documents at all times. The Contractor is to source the documents that are relevant to the type of work to be carried out.

3.6 General Contractor's Management Systems and Management Plans

a. The Contractor must have a quality management system, safety management system and an environmental management system, as either an integrated management system or three separately documented systems. The system(s) must be certified by an accredited certifying organisation to the nominated international or Australian standard and must include the work requirements of this Contract in that certification.

b. In addition, the Contractor must maintain Contract specific quality, work health and safety (WHS) and environmental management plans for the entire Contract term.

c. Both the Contractor's management systems and the Contract specific management plans may be subject to review by the Network Business before the commencement of the Services. Where the plans require amendment, the amended plans must be submitted to the Network Business within one week of requesting the amendment.

d. The Contractor must promptly update the management plans from time to time to take account of changes to relevant legislative requirements and submit the updated management plans to the Network Business.

e. The Network Business owes no duty to review the management plans in respect of their adequacy for the Services or for errors, omissions or compliance with any Contract and no comments on, reviews or rejection or consent to the use of the plans will in any way lessen or otherwise affect:
   i. The Contractor's liabilities or responsibilities under the Contract or otherwise according to law;
   ii. The rights of the Network Business against the Contractor under the Contract or otherwise according to law.

4 SAFETY

4.1 WHS Requirements

4.1.1 Specific Duties

a. Without limiting clause 9 of the General Conditions of Contract, the Contractor must comply with the Work Health and Safety Act 2011 (NSW) (WHS Act) in relation to the Services.
http://www.legislation.nsw.gov.au/maintop/view/inforce/act+10+2011+cd+0+N

b. The Contractor has various obligations under the WHS Act, for example, to provide a safe system of work at all times and to provide and maintain a work environment without risks to health and safety.

c. Without limiting clause 9 of the General Conditions of Contract, the Contractor must also comply with all applicable obligations under the Work Health and Safety Regulation 2011 (NSW) (WHS Regulation) and relevant codes of practice in relation to the Services.
http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+674+2011+cd+0+N

d. Under Chapter 6, Part 6.1, clause 293 of the WHS Regulation, the Contractor will be engaged as the 'Principal Contractor' for the construction project. If the Network Business is not able to validly engage the Contractor as the Principal Contractor under the WHS Regulation, the Contractor will discharge the principal contractor obligations set out in the WHS Regulation under the Contract as if the Contractor had been validly engaged as the Principal Contractor in respect of the Services and the Contractor must discharge the duties of a principal contractor set out in the WHS Regulation.

e. Without prejudice to other rights the Network Business has under the Contract, the Contractor must immediately comply, and ensure that all Contractor personnel immediately comply, with a direction issued by the Network Business, a Network Business Representative, a Contract Inspector or a safety adviser, where the direction is issued because the Network Business, the Network Business Representative, the Contract Inspector or the safety adviser reasonably considers there is an imminent risk to the health and safety of a person arising from the performance of the Services.

4.1.2 Safety Management System

a. The Contractor must have a safety management system accredited to AS/NZS 4801:2001 or is able to be accredited and operational within three months of the commencement date of the Contract.

4.1.3 WHS Risk Management

a. The Contractor must ensure full compliance with Chapter 3, Part 3.1 of the WHS Regulation in relation to the Services. All potential risks must be identified, assessed and where the risk is deemed unacceptable, must be eliminated. If it is not reasonably practicable to eliminate identified risks, the risks must be minimised or controlled to as low as reasonably practicable.

b. It is the Contractor's responsibility to undertake a full risk assessment of all aspects of the work requirements of this Contract and to implement the appropriate control measures. The contractor must ensure the control measures are fit for purpose, suitable for the nature and duration of the work, communicated, effectively implemented, and work as designed.

c. Clause 38 of the WHS Regulation also requires a review of control measures to be carried out:
   i. Whenever the control measure does not control the risk it was implemented to control so far as is reasonably practicable;
   ii. Before a change at the workplace that is likely to give rise to a new or different risk to health or safety that the measure may not effectively control;
   iii. If a new relevant hazard or risk is identified;
   iv. If the results of consultation by the duty holder under the WHS Act or the WHS Regulation indicate that a review is necessary;
   v. If a health and safety representative requests a review.

d. The health and safety risks and hazards relating to the vegetation management services are as follows (but are not limited to):
   i. Exposure to uncontrolled discharge or contact with electricity;
   ii. Working in remote areas;
   iii. Exposure to hazardous chemicals / materials;
   iv. Fall from height;
   v. Motor vehicle accident;
   vi. Unintended contact with mobile powered plant;
   vii. Struck by falling or moving object;
   viii. being hit by falling object;
   ix. being trapped by moving machinery or equipment;
   x. being trapped between stationary and moving objects;
   xi. being hit by moving objects including manual tools Incident while undertaking lifting operations;
   xii. Breach of a controlled worksite when working near or around traffic;
   xiii. Dealing with threats of violence from the public.

e. The Contractor is to provide a written copy of the completed risk assessment and risk control measures to the Network Business prior to commencing the delivery of the Services.

4.1.4 WHS Management Plan

a. The Contractor must provide a copy of the WHS Management Plan (WHSMP) specific to the Services and safe work method statements to the Network Business.

b. For the WHSMP, the Contractor must:
   i. Prepare the plan for the workplace before commencing the Services to be performed at the workplace;
   ii. Ensure that Contractor personnel, anyone working at the workplace and anyone carrying out work in connection with the Contract is made aware of the WHSMP and inspects it before commencing work;
   iii. Revise and review the WHSMP and ensure it remains up to date;
   iv. Ensure that all workers are made aware of any revision;
   v. Ensure a copy of the WHSMP is kept until the expiry of the contract Term and that a copy is made available to any person who is to carry out the Services and is available for inspection. If a notifiable incident occurs, the WHSMP must be kept for at least two years after the incident.

c. The WHSMP must include the following items, where applicable:
   i. Names, positions and health and safety responsibilities of all persons at the workplace whose positions or roles involve health and safety responsibilities, including safety officers and health and safety representatives;
   ii. The arrangements in place for consultation, cooperation and coordination;
   iii. The arrangements in place for managing any work health and safety incidents;
   iv. Any workplace specific health and safety rules and the arrangements for

ensuring that all persons at the workplace are informed of those rules;

v. The arrangements for collection and any assessment, monitoring and review of safe work method statements.

4.1.5 Safe Work Method Statements

a. Safe work method statements (SWMS) must meet the requirements of the WHS Regulation and the Safe Work Australia Code of Practice – Construction Work.

b. The safe work method statement is a document that:
   i. Lists the type of construction work being completed;
   ii. States the health and safety hazards and risks arising from that work;
   iii. Describes how the risks will be controlled; and
   iv. Describes how the control measures will be put in place and maintained.

c. The Contractor must prepare the SWMS for each relevant part of the Services before that part of the Services is performed. SWMS should be prepared with the workers who will be undertaking the tasks to which it relates.

d. The SWMS must be updated and maintained throughout the Contract period and made available to all persons undertaking the work, health and safety inspectors, any authorised person or any other workers within the vicinity.

e. SWMS should be easy to read and understand and can comprise or include flow charts, diagrams, tables and maps, etc.

f. The control measures identified in the SWMS should be clearly specified.

g. The Contractor must put in place arrangements for ensuring that the task, job or work is carried out in accordance with the SWMS for the Services

4.1.6 Hazard Identification and Assessment

a. In association with the SWMS for the performance of the Services, the Contractor must carry out a hazard identification and assessment before performing that relevant part of the Services at a workplace and continually monitor for any potential hazards which may arise.

b. Copies of the hazard assessment must be signed by all Contract personnel at the workplace and provided to the Network Business on request.

c. Hazard assessment documentation must be retained for a term of six months from the date of the claim for payment for the work subject to the hazard assessment. Hazard assessment documentation covering work where a Notifiable Incident has occurred must be retained for five years.

4.1.7 Hazardous Situation

a. Where the Contractor becomes aware of a hazardous situation at any stage which cannot be corrected within the scope of the Contract, the Contractor must make every effort to ensure the safety of people and property and must immediately contact the Network Business in accordance with section 4.1.10.4.

b. If necessary, an adequate number of contract personnel must remain on site to ensure the safety of the public until directed otherwise by the Network Business.

Where a hazardous situation escalates and meets the definition of an incident as

defined in clause 4.1.7, the Contractor must report the incident in accordance with clause 4.1.10.1.

4.1.8 Fitness for Work

The Contractor must have in place Fitness for Work policy, systems and procedures.

These are to include, but not be limited to:

i. Fatigue management;
ii. Health and wellness (e.g. manual handling, bullying & harassment);
iii. Employee assistance programs;
iv. Drug and alcohol management program (in alignment with AS3547-1997; Breath alcohol testing devises for personal use and AS/NZS 4308:2008 Procedure for specimen detection and quantitation of drugs of abuse in urine); and
v. Early intervention and return to work.

4.1.9 Compliance Audits

The Contractor's WHS management system must include an audit and assurance program for work, health and safety compliance as per the requirements of AS/NZS 4801:2001.

4.1.10 WHS Incidents

a. A WHS incident may include any event or situation in a workplace which has impacted on the health, safety or wellbeing of any person; or poses an immediate threat to the health, safety or wellbeing of any person (even though the injury or illness has not yet occurred). WHS incidents include (but are not limited to):
   i. an incident in which any person has been injured or requires medical attention, as a result of (or during) work activities undertaken during performance of the Services,
   ii. a near miss in which any person could have been injured as a result of work activities undertaken during performance of the Services, and
   iii. any injury (including long term or late report) which is alleged to have occurred as a result of work activities undertaken during performance of the Services.

b. The Contractor must ensure that any notifiable incident prescribed by the WHS Act is:
   i. notified in the manner and form prescribed by the WHS Act to the relevant Authority, and
   ii. notified to the Network Business immediately, with a confirmatory notice in writing to the Network Business Representative within 24 hours of its occurrence and accompanied by any documentation provided to the relevant Authority.

c. The Contractor must ensure that all available details concerning any WHS incident are notified to the Network Business immediately, with a confirmatory notice in writing to the Network Business Representative within 24 hours of its occurrence in accordance with section 4.1.8.1. This applies whether or not the Contractor is also required to notify the incident under the WHS Act.

d. If an incident occurs, the Contractor is to ensure the following steps are taken by Contractor Personnel managing the incident:
   i. check their own safety,
   ii. plan their actions;
   iii. make the area safe immediately,
   iv. control any immediate danger to people and the workplace,

v. provide first aid,
vi. where required, contact emergency services, and
vii. use the emergency procedures described in the WHSMP.

e. The Contractor should then:
i. cooperate with any authority, for example, police, WorkCover etc., and
ii. remain at the incident scene until instructed to leave.

f. The Contractor must not disturb the site of the incident until an inspector arrives or until an inspector gives a direction, unless disturbance is necessary to assist or remove the injured person or minimise the risk of a further incident, or permission has been given by the inspector or relevant authority.

4.1.10.1 Reporting of incidents to the Network Business

a. The Contractor must complete the relevant Network Business form for all notifiable incidents or WHS incidents reported in accordance with the above requirements. This form must be forwarded to the Network Business Representative within twenty four hours of the incident occurring.

b. Details of all WHS incidents, including those reported in accordance with the above procedure must be provided to the Network Business on a monthly basis in accordance with section 4.1.8.3, regardless of their nature.

c. All Contractor documentation relating to an incident must be retained by the Contractor as required by the WHS Act – for a notifiable incident, this is five years.

4.1.10.2 Incident Investigation and Reporting Outcomes to the Network Business

a. The Contractor must establish or utilise a process for classification and management of incidents that provides for timely and appropriate investigative response (in terms of processes, skills and resources) to a WHS incident. The incident management and classification process should provide detail, at a minimum, on the triggering and procedural aspects of the following investigative management actions and responses;
i. the decision to initiate an investigation,
ii. the determination of the appropriate level of investigation,
iii. the determination of the investigation personnel,
iv. accountability for management of the investigation,
v. the gathering of timely and factual evidence (including perishable),
vi. causal analysis,
vii. reporting and escalation,
viii. corrective actions, communication & shared learnings, and
ix. external notification (regulatory authorities).

b. Investigations are not limited to serious injury events, but also include near miss events, damage to equipment or property, complaints and any other range of situations where a detailed analysis of an event is required.

c. If the investigative process is not thorough it can lead to actions that address symptoms and not the actual underlying cause. This increases the potential for the unwanted event to re-occur because of a failure to learn.

d. The Network Business may conduct its own investigation into any WHS incident relating to the Services.

e. The Contractor must provide a process for the communication and tracking of corrective and preventative actions arising from any WHS incident, the timeframe for

completing corrective and preventative actions and the person/s responsible for carrying out corrective and preventative actions. The Contractor must prepare a written report about this process and provide the report to the Network Business before providing the Services.

f. The final incident investigation report must be provided to the Network Business within a reasonable time.

4.1.10.3 WHS statistics

Using the monthly WHS statistics report, the Contractor must provide WHS statistics to the Network Business on a monthly basis as per section 10.2 and as follows:

a. Contractor Total Recordable Injuries related to the Services only,
b. Contractor Total Recordable Injury Frequency Rate across the Contractor's total business and projects,
c. Contractor Lost Time Injury related to the Services only,
d. Contractor Lost Time Injury Frequency Rate across the Contractor's total business and projects, and
e. Contractor Near Miss also defined as a Near Hit related to the Services only.

4.1.10.4 Contacting the Network Business Representative for WHS incidents

a. The WHS incident must immediately be reported to the Network Business Representative or where that contact is not successful, the Network Business emergency on call number 0418 271 137 (for Ausgrid) 13 20 80 (for Essential).

b. Where a WHS incident occurs outside of normal working hours, the incident must immediately be reported to the Network Business emergency on call number 0418 271 137.

c. In all cases where the Network Business emergency on call officer cannot be contacted on mobile number 0418 271 137, a message must be left on that number providing a return name and contact number. The Contractor must then immediately inform Ausgrid's Hazard Alert Line by telephoning 13 1471 and request that the Network Business' Representative be notified.

4.1.11 Site Restrictions and Public Safety

a. The Contractor must ensure all work sites are safe to members of the public at all times when completing the Services.

b. The Contractor must ensure that all materials and equipment associated with the Services are stored in safe places to avoid the risk of injury to members of the public in accordance with section 4.1.10.

c. The Contractor must provide appropriate WHS signage (refer to section 7.10), fencing, guarding, temporary access and lighting for all Services provided under the Contract as necessary due to the nature of the works. The Contractor must accommodate and protect the public, vehicles, animals and occupiers of property in and around the premises.

d. All signs, lights, warning notices and barriers must comply with the requirements of AS 1742.

4.1.12 Personal Safety Equipment, Safety and Environmental Equipment

a. The Contractor must ensure that clauses 44, 45 and 46 of the WHS Regulation are complied with.

   Appropriate personal safety equipment must be provided by the Contractor to ensure that all Contract personnel are adequately protected from all hazards associated with the performance of the Services. All Contract personnel that are engaged in the works of this Contract and are engaged in a role that requires completion of the Electrical

Safety Rules training, must wear clothing in accordance with a minimum rating of 4 cal/cm2 as recommended in the revised NENS 09 Guideline.

b. The personal safety equipment must comply with Australian Standards and the relevant Network Business electrical safety regulation and include, but not be limited to, the following items:

   i. protective eyewear,
   ii. safety helmets,
   iii. ear muffs,
   iv. mask,
   v. gloves,
   vi. reflective vest or clothing to be used when on or near roadways,
   vii. sun protection including sun screen SPF 30+, and
   viii. safety footwear (to be worn at all times).

c. The requirements of ISSC EC14 – Guide to Electrical Workers' Safety Equipment must be followed at all times. The inspection of personal safety equipment must be carried out before each use.

d. The Contractor must ensure the following safety and environmental items are provided on site and readily available at all times where required:
   i. burns kit,
   ii. fire extinguisher,
   iii. spill kit, and
   iv. communications devices for contact with crews/employees and Network Business staff and system control including devices suitable for communication in remote areas.

4.1.13 First Aid Provisions

a. The Contractor must ensure that the requirements of clause 42 of the WHS Regulation and any other applicable legislative requirement, code of practice and Australian standard concerning first aid are complied with in respect of the Services.

b. The Contractor must also ensure a minimum of one person performing work at the workplace holds a current first aid certificate and that person has training in the type of incidents that may occur while performing the Services. If there is only one at the relevant worksite, he or she must remain at the workplace at all times while work is undertaken or close the worksite down when leaving.

4.1.14 Traffic Control Requirements

a. All traffic control works must be provided in accordance with all relevant Roads and Maritime Services (RMS) regulations and Australian Standards. All works must be completed in accordance with the RMS issued 'Traffic Control at Work Sites v4' (or its successor).

b. The Contractor must supply a worksite specific Traffic Control Plan (TCP) highlighting the traffic and pedestrian control requirements for each worksite and a copy must be kept on site at all times.

c. The Contractor will be required to apply traffic control (cones, signs, barricades, lights and the like) to each worksite in accordance with the TCPs which must be inclusive in the costs for all Services.

d. The Contractor is also responsible for the provision of:
   - the required personnel resources in accordance with the TCP, and
   - all necessary vehicles, signage and equipment to enable appropriate traffic control.

e. The Contractor is also responsible for obtaining all required traffic control permits and/or licences from the appropriate authority, for example RMS or local councils.

f. Contract personnel carrying out traffic control duties whether applying traffic control or performing the role of a traffic controller must have current and appropriate qualifications required by the RMS and in accordance with section 4.4.6.

g. All traffic control signs and devices must be in accordance with AS 1742.3 which specifies the sizes for temporary road works signs.

h. The provision of required traffic control includes the provision of traffic control for electrical outages and HV CATT crews.

4.2 Electrical Safety Rules

4.2.1 Introduction

a. The Electrical Safety Rules of the Network Business prescribe the manner in which work is carried out on or near the Network Business' electricity network and must be followed at all times. The Contractor must ensure that a copy of the latest version of the relevant Network Business Electrical Safety Rules is present on site at all times.

b. Mandatory training in the Network Business Electrical Safety Rules must be completed every twelve months in accordance with section 4.4.6.

4.2.2 Safe Work Clearances

The Contractor must ensure that all Contract Personnel comply with the requirements of the relevant Network Business Electrical Safety Rules and that Contract personnel do not approach live, uninsulated mains any closer than the safe working clearances detailed in the Electrical Safety Rules. All extensions of a person, such as uninsulated tools and clothing, must also remain outside these clearances.

4.3 Plant and Equipment Requirements

4.3.1 Maintenance Requirements

a. The Contractor must provide and be responsible for the proper use and maintenance of all necessary materials, tools, plant, equipment and transport necessary to ensure that all works are carried out in a safe and environmentally responsible manner to meet all Contractual requirements.

b. The Contractor must immediately notify the Network Business where nominated resources are not maintained. The Contractor will be required to provide contingency details about how nominated resources will be maintained in the event of breakdowns, EWP rebuilds, extended leave of Contract personnel, etc.

4.3.2 Equipment Audit

a. Any tool, plant or equipment supplied by the Contractor and considered to be unsafe or environmentally unsuitable by the Network Business, must be immediately

replaced. Unsafe use of equipment may cause the work to be suspended until details of proposed modifications to the Contractor's work practices have been submitted to, and approved by the Network Business.

b. Where the validity of electrical testing of any equipment is in doubt, the Network Business may arrange for the equipment to be retested at a NATA registered electrical testing facility. Where the equipment passes testing, the Network Business will bear the associated costs, where the equipment fails testing, the Contractor will bear the associated costs.

4.3.3 Specific EWP Requirements

a. The Contractor must pay particular attention to the requirements outlining the use of Elevating Work Platforms (EWP) engaged in any work carried out in close proximity to electrical powerlines and apparatus detailed in the Australian Standard AS 1418.10:2011 Cranes hoists and winches, Part 10: Mobile elevating work platforms and the relevant Network Business Electrical Safety Rules.

b. A certificate of compliance must be provided for each EWP and signed by the Contractor certifying that the EWP fully meets all Contract requirements and complies with the requirements of AS 1418.10:2011. In addition, the Contractor must provide a current Electrical Test Certificate/Report by a recognised testing company, documenting that all required tests for the vehicle, tools and equipment have been passed for each EWP.

c. The Test Certificate must cover all requirements of the Network Business Electrical Safety Rules. EWPs using stand-off pipes (bed rails) as boom insulation or to prevent inadvertent contact with electrical conductors must not be used on this Contract without specific written permission from the Network Business.

4.3.4 Earth Sets

a. The Contractor must provide the appropriate number of the Network Business supplied earth sets as required at each worksite. The Contractor will be responsible for inspecting the earth sets prior to each job to ensure the earths are within the test dates and are not damaged in any way to affect their overall integrity.

b. The Contractor will be responsible to deliver the earth sets ready for test every six months to the appropriate Network Business premises.

4.4 Training and Authorisations Requirements

4.4.1 Contractor Induction Process

a. All Contract personnel must receive a Contract induction by the Contractor prior to commencing work.

b. The Contractor’s induction document must in addition to the relevant Network Business requirements, detail the company’s structure, obligations under the Contract, obligations and responsibilities of Contract personnel including a Code of Conduct, and the Contractor’s policies and responsibilities relating to quality, safety, environment, customer relations, manual handling and property damage.

c. A copy of the Contractor’s induction document must be provided to the Network Business prior to the commencement of the Services.

4.4.2 Network Business Induction Requirements

General Requirements:

a. The Contractor and Contractor Personnel will be required to attend a pre-work induction prior to commence delivering the Services

b. This induction session provides an introduction to the Network Business and highlights the obligations and the responsibilities of the Contractor and Contractor Personnel in undertaking Vegetation Management Services on behalf of the Network Business.

4.4.2a Induction Requirements

a. The minimum entry level of training required to receive an induction includes: the general construction induction, the Network Business Electrical Safety Rules and environmental, perform cardiopulmonary resuscitation (CPR), perform rescue procedures for live LV panel, and first aid in the ESI environment training modules. These modules must be completed prior to requesting inductions for Contract personnel.

b. The Contractor must request a password to access web based induction training for each person to be inducted by emailing <Contractorsafety@ausgrid.com.au>.

c. The inductee will be required to log in to the web based induction training, upload a photo and complete training information and dates. The inductee will be required to complete the learning modules in their own time.

d. Once the Contract personnel have completed the web based induction training, the Contractor must request an induction assessment by emailing <Contractorsafety@ausgrid.com.au>. The request must be entered prior to Thursday at 9:00 am for any given week. Induction assessments will run on Tuesday of each week or as required.

e. Contract personnel attending induction assessments must have original certified evidence of the completion of all minimum training requirements including their general construction induction training and 100 points of identification (a driver's licence and credit card is sufficient). Failure to produce this evidence at the induction will result in the Contract personnel being excluded from the session.

f. Induction will be assessment only. Inductees will undertake a competency based assessment and have two opportunities to pass the assessment. If the inductee is unsuccessful, they will be required to repeat the web based induction at another time and then repeat the induction assessment on another occasion.

g. If competence is achieved, an induction sticker is printed and placed in the relevant ESI Skills Passport (refer to section 4.4.4) and a Network Business induction card is issued.

h. Contract personnel will then be required to complete an authorisation onto the Contract in accordance with section 4.4.3.

4.4.2.1 Temporary Contractor Personnel Induction

a. On occasions, it may not be feasible for the Network Business to provide an induction

to Contractor Personnel who work infrequently for the Contractor on Network Business Contracts e.g. crane operators and delivery drivers. In such cases, the Contractor must provide Contractor Personnel with a site induction at each new worksite.

b. The induction must be documented using 'DC0090 Induction Checklist – Temporary SubContractor'. The completed form must be retained with the hazard assessment sheets relevant to the job they are specifically working on and a copy must be attached to each weekly report.

c. The adequacy of the use of the temporary subContractor's induction will be at the discretion of the Network Business.

4.4.3 Baseline Audit

a. It is required that all Contractor Personnel are fully trained, qualified and authorised prior to commencing the Services, and all plant and equipment is suitable and approved for use to provide the Services.

b. The Contractor will be required to arrange for all Contract personnel, plant and equipment to attend a baseline audit and/or authorisation prior to commencing the delivery of the Services. The baseline audit and/or authorisation will be conducted on a date and at a location designated by the Network Business' Representative.

4.4.4 Authorisations

a. Prior to commencing the Services all Contractor Personnel require authorisation:

   i. The Network Business is part of the Energy Networks Association (ENA) and as a Network Operator endorsed the transition and implementation of the Electricity Supply Industry (ESI) Skills Passport (the Passport).

   ii. The rules and administration of the Passport describe the minimum requirements in regard to training and associated refresher training for ESI workers and ensures workers in the electricity industry meet and maintain the same base level of skills which are recognised across jurisdictions http://www.esipassport.com.au/site/EsiPassport/filesystem/documents/ESI%20Passport%20Rules%20-%20APRIL%202011.pdf. The Network Business can issue passports and recognise passports issued by other network operators as governed by these rules.

   iii. All ESI Skills Passports must be safeguarded at all times and lost or damaged passports must be immediately reported to the Network Business.

4.4.5 Network Business Supplied Training

a. The training requirements are detailed in section 4.4.6. The Network Business will only provide initial and refresher training in the relevant Network Business Electrical Safety Rules and Environmental modules.

b. Annual refresher training in the relevant Network Business Electrical Safety Rules and Environmental modules will be provided at no cost to the Contractor for the tuition, assessment or venue for up to the total approved minimum numbers of Contract personnel to be provided under the Contract. Contractors will however incur costs of $350 per person for non-attendance or cancellations up to two weeks prior for pre-booked initial/refresher training sessions.

4.4.6 External Training Requirements

The Contractor must ensure that all Contract personnel are fully conversant with the work they are required to perform under this Contract and that, before any work commences, they are qualified, trained and competent to carry out their duties. The matrix in Appendix E details the minimum training and qualifications of Contract personnel.

4.4.7 Recognised / Approved Training Organisations

a. Course codes beginning with UETT must be trained to the Australian Quality Training Framework (AQTF) to meet the national competency standards. Said training must be delivered and assessed by Registered Training Organisations (RTO) of the Contractor's choice.

b. All other training courses must be carried by recognised/approved training organisations. The Contractor should request further information from the Network Business Representative when unclear if the training is appropriate and will be accepted by the Network Business. The adequacy of training and competency of all Contract personnel will be at the discretion of the Network Business.

4.4.8 Training Register

The Contractor must establish and maintain a register of all inductions and training provided to all of the Contractor's personnel in accordance with all legislative requirements of the WHS Regulation. Compliance to legislative training requirements must be reported to the Network Business in the monthly report in accordance with section 10.2.

4.4.9 Arboriculture Requirements

In order to provide advice and to oversee the vegetation clearance techniques used by Contract Personnel, the Contractor must ensure that sufficient authorised Contract Personnel under this Contract are trained in formal arboriculture qualifications (minimum qualification is NSW TAFE Certificate 3 in Horticulture (Arboriculture) or equivalent), and one is trained as a horticulturalist (minimum qualification is NSW TAFE Certificate 3 in Horticulture or equivalent). This can be the same person under the Contract.

4.4.10 Compliance Statements

A compliance statement will be maintained by the Contractor confirming all Contractor Personnel are authorised, trained and qualified as required by this Specification and the Contract.

5 QUALITY

5.1 Quality Management System

5.1.1 Quality Management System

The Contractor's quality system must be certified by an accredited certifying organisation to at least AS/NZS ISO 9001:2008. If not, the Contractor would be required to adequately demonstrate a fundamental knowledge of Quality Assurance Systems and that those fundamentals are in place within their organisation.

5.1.2 Quality Management Plan

a. Prior to commencing the work the Contractor must submit a quality management plan specific to the Contract to the Network Business. The plan must be maintained throughout the entire Contract term and must fully detail the Contractor's procedures to be followed to ensure that all obligations and requirements under the Contract are met. The Contractor may choose to use the following document as a guide during the development of the quality management plan:
   i. Guidelines for Quality Management Plans detailed in the:
      - NSW Government Quality Management Systems Guidelines – for Construction (June 2005, amended March 2012)

      http://www.nswprocurement.com.au/psc/nsw_government_guidelines/qms_guidelines.aspx

   ii. Appendix D (of the document outlined above):
      - Quality Management Plan assessment checklist http://www.nswprocurement.com.au/psc/nsw_government_guidelines/qms_guidelines_appendix_d.aspx

b. Failure to maintain an acceptable Quality Assurance Management System and Contract specific Quality Plan shall be a breach of Contract as defined in the Contract.

6 ENVIRONMENT

6.1 Environmental Legislation

The Contractor is bound to comply with, but not limited to, the:

a. Protection of the Environment Operations Act 1997,
b. Protection of the Environment Legislation Amendment Act 2011,
c. Protection of the Environment Operations (Waste) Regulation 2005 (Waste Regulation),
d. Waste Avoidance and Resource Recovery Act 2001,
e. Threatened Species Conservation Act 1995 No 101,
f. National Parks and Wildlife Act 1974 No 80,
g. Native Vegetation Act 2003 No 103,
h. Noxious Weeds Act 1993 No 11,
i. Heritage Act 1977 No 136,
j. Local Government Act 1993 No 30,
k. Sydney Water Catchment Management Act 1998 No 171,
l. Environment Protection and Biodiversity Conservation Act 1999,
m. State Environmental Planning Policy (Infrastructure) 2007, and
n. Local Environment Plan for relevant LGA's.
o. Environmental Planning and Assessment Act NSW 1979

6.2 Environmental Requirements

a. All work must be carried out in an environmentally acceptable and responsible manner and in accordance with NUS 174 ‘Environmental Procedures.

b. The Contractor’s environmental management system and environmental management plan must be submitted to the Network Business before the commencement of the Services and must be maintained throughout the entire Term.

c. In carrying out the Services, the Contractor must:
    i. minimise the generation of waste,
    ii. demonstrate an understanding of vegetation species and the appropriate management of that species,
    iii. avoid cross contamination of noxious weeds and include pest and disease management by implementing bio security measures outlined in section 6.7.3,
    iv. separate generated wastes for re-use or recycling,
    v. use low-waste products and products with recycled content, wherever these are technically suitable and cost and performance competitive,
    vi. keep disturbance of the existing environment to a minimum to avoid water runoff, scouring, soil erosion and subsidence.

6.3 Environmental Risk Management

To inform the development of SWMS’s the Contractor must carry out environmental risk assessments on the potential for significant hazardous environmental events, prior to undertaking the Services at a workplace. The environmental risk assessments must include and cover, but not be limited to the following:

a. polluting the environment,
b. unauthorised development or damage to flora/fauna or heritage,
c. inappropriate management of waste and contaminated materials, and
d. emissions (e.g. sound) causing nuisance to the community.

6.4 Environmental Management System

a. The Contractor must have an Environmental Management System that has been accredited to either Australian Standard AS 14001:2004 or to the NSW Department of Commerce and Services Guidelines for Environmental Management Systems, or can be accredited within three months of commencing the Services. Contractors in the process of gaining accreditation must be able to demonstrate significant progress.

b. Accreditation to the NSW Public Works and Services Guidelines for Environmental Management Systems must remain current and be renewed bi-annually.

6.5 Operational Environmental Management Plan

a. The Contractor must provide an Operational Environmental Management Plan (OPEMP) specific to the Contract to the Network Business and aligned with ISO14001:2004. This plan must show how the Contractor will comply with environmental documentation and law. The plan must be structured in accordance with the guidelines for environmental management plans detailed in the NSW Government Environmental Management System Guidelines (3rd edition, August 2013 (updated 30 May 2014) https://www.procurepoint.nsw.gov.au/.../construction-guidelines- environmental-management-systems-ed3.

b. The OEMP must:

i. detail the key environmental risks of the work to show that the Contractor understands the environmental risks,
ii. detail the control measures which will be implemented to manage these risks in accordance with the Contract, better practice and law,
iii. define environmental responsibilities and authorities for personnel working on the project and particularly the role of the Environmental Management Representative (EMR),
iv. detail a commitment to the environment which includes a commitment to:
- carry out Contracted works in accordance with all environmental laws and comply with relevant environmental licences, approvals and permits,
- carry out work in an environmentally responsible manner so as to protect the environment,
- the conservation of species,
- protection of heritage items or places (in particular vegetation and curtilage), and
- pollution prevention and control.

v. include a notification procedure which requires the Contractor to immediately notify the Network Business, in writing, if any complaint, order or direction is made, or any proceedings are instituted by any person (including any state or local government authority or any statutory authority) against the Contractor in respect of any allegation of:
- contamination or pollution arising out of or in connection with the performance of the Contractor's obligations under the Contract, and
- the Contractors non-compliance with any relevant laws regarding the environment.

vi. detail procedures for:
- a pre-work site environmental hazard identification and risk assessment check as part of the procedure detailed in clause 4.1.6,

- ensuring that all plant, equipment and personal safety equipment is checked daily for serviceability and adequacy, prior to the commencement of work,
- identifying threatened species, threatened ecological communities and critical habitats around the overhead electricity supply network, flora and fauna datasets will be provided by the Network Business,
- Identifying and protecting European and Aboriginal heritage sites,
- installation and maintenance of proper environmental controls at all worksites, as required,
- reporting, responding, mitigating, and investigating incidents and near miss incidents affecting the environment,
- implementing corrective and preventative actions associated with pollution incidents and non-conformances,
- managing subContractors to ensure their compliance with the EMP and relevant permits, licences, and approvals,
- communicating with members of the public and media,
- monitoring, inspection and auditing of environmental performance against requirements in all relevant environmental documentation. This must include timing/frequency and responsibilities,
- keeping records of training, authorisations, audit results, and other documentation necessary to comply with the EMP,
- ensuring all personnel are adequately supervised, trained, resourced to effectively implement the control measures in the EMP,
- ensuring all personnel are aware of the risks, control measures and responsibilities, and
- keeping environmental documentation accessible to all personnel when undertaking the work.

vii. detail procedures for dealing with and investigating environmental incidents including:

- a process for classification of incidents that provides for timely and appropriate investigative response (in terms of investigative processes, skills and resources) to a pollution incident,
- investigations, not limited to Notifiable Incidents to the EPA, but also include incidents reported to the Network Business,
- The Network Business being able to conduct a concurrent investigation into any pollution incident relating to a Contractor to prevent a re-occurrence or to investigate any failures in the Contractor management processes, and
- a process for the communication and tracking of corrective and preventative actions, the timeframe for completing corrective and preventative actions and the person/s responsible for carrying out corrective and preventative actions must to be reported in writing to the Network Business.

6.6 Environmental Management Representative (EMR)

a. Prior to commencing the Services the Contractor must appoint an Environmental

Management Representative (EMR).

b. The EMR must:
   i. be responsible for the overall environmental performance of the Services,
   ii. have adequate authority and resources to implement, monitor and assess the performance of the EMP,
   iii. be responsible for notification and reporting any incidents.

6.7 EMP Compliance

The Contractor must comply with the EMP at all times while carrying out of the Services.

6.8 Environmental Reporting

6.8.1 Reporting Environmental Incidents

a. The Contractor must immediately notify the Network Business of all pollution incidents. A 'pollution incident' includes a leak, spill or escape of a substance, or circumstances in which this is likely to occur.

b. The Contractor must cooperate with the Network Business and relevant authorities to rectify or contain the pollution incident. Where the relevant Network Business Representative cannot be contacted, the Contractor must contact the Environmental Services Unit on: 9394 6659 or 0412 070 574 with the details of the incident. The Network Business may refer the Contractor to directly contact the NSW Office of Environment and Heritage, Environmental Protection Agency depending on the seriousness of the incident.

c. The Contractor must also complete the relevant environmental incident notification form for all pollution incidents reported in accordance with the above requirements. This form is to be forwarded to the designated Network Business representative within 24 hours of the incident occurring.

6.8.2 Legislative Environmental Reporting Requirements

6.8.2.1 Overall Control Under NGER Act

The Contractor and the Network Business acknowledge and agree that, for the purposes of the National Greenhouse and Energy Reporting Act 2007 (Cwlth), related regulations and legislative instruments (together NGER Legislation):

a. the Contractor has, as between the Network Business and the Contractor, the greatest authority to introduce and implement operating policies, environmental policies and health and safety policies in respect of the work the Contractor (and any Contractor Personnel) carries out under this Contract, in light of the requirement for the Contractor to prepare its own quality management system and quality plan, safety management system and WHS management plan, environmental management system and environmental management plan, and to comply with them at all times when performing the Services.
b. the Contractor has overall control over the delivery of the Services (without prejudice to the other provisions of this Contract).
c. if required under the NGER Legislation, the Contractor must report the greenhouse gas emissions and the production and consumption of energy attributable to the work carried out during the delivery of the Services.

6.8.2.2 Provision of Greenhouse Data

If a party (reporting party) is required to report under the NGER legislation in

relation to the work performed under this Contract, the other party must, if requested by the reporting party, provide to the reporting party with all data, information, records and reports within the other party's ownership or control, of the type that a registered corporation or any other person may be required or entitled to provide under the NGER Legislation, including as to:

a. greenhouse gas emissions, energy production and energy consumption,
b. reduction of greenhouse gas emissions, removal of greenhouse gases or offsets of greenhouse gas emissions from any greenhouse gas project, and
c. relating to any aspect of the other party's activities, or the activities of the other party's personnel, in connection with the delivery of the Services (greenhouse data). The other party must provide the greenhouse data to the reporting party to the extent that, in a manner and form that, and at times that, will enable the reporting party to comply with the NGER Legislation.

6.8.2.3 Reporting and Retaining Greenhouse Data

The Contractor must:

a. collect and record all such greenhouse data as may be required to enable the Contractor to discharge its obligations under section 6.6.2 and keep that greenhouse data for a period of not less than seven years after the end of the year in which the relevant activities take place, and
b. permit any persons appointed or authorised by the Network Business to examine, monitor, measure, copy, audit and/or verify the greenhouse data, and cooperate with and provide all reasonable assistance to any such person (including doing such things as giving access to premises, plant and equipment, producing and giving access to documents and answering any relevant questions).

6.8.2.4 Contractor's Acknowledgement

The Contractor acknowledges and agrees that:

a. The Network Business may provide or otherwise disclose the greenhouse data to any applicable authority,
b. the Contractor's promises and obligations in the 6.6.2 clauses:
    - are given and assumed by the Contractor in favour of the Network Business (in exchange for valuable consideration from the Network Business)
    - are enforceable by the Network Business; and
c. nothing in this clause is to be taken as meaning that the Network Business has agreed to perform on the Contractor's behalf any statutory obligation that the Contractor may have regarding the provision of greenhouse data to any applicable authority.

6.9 Environmental Site Requirements

6.9.1 Removal, Recycling and Disposal of Waste Materials

a. The Contractor is responsible for the prevention of littering by their Contractor Personnel during the course of the work. The Contractor is required to leave the work site clean and tidy by removing all non-leaf debris, surplus and waste materials and used packaging from the site.

b. The Contractor is responsible for the recycling and or disposal of all recovered or waste materials, in accordance with relevant environmental protection legislation. Items to be disposed of must remain segregated from new items at all times.

c. Waste tracking documentation covering the disposal of all restricted solid or

hazardous waste materials must be provided to the Network Business after the materials have been disposed of. In addition, proof of the environmental acceptability of the disposal method must also be provided to the Network Business.

d. Bins located on the premises of the Network Business must not be used for the disposal of recovered materials.

e. Where recovered or waste materials are disposed of in any other way, full details of the disposal methods must be provided to the Network Business upon request.

6.9.2 Dumped Rubbish

a. The Contractor may encounter piles of dumped rubbish on easements or Access Tracks. The Contractor must report the location, rubbish type and estimated amount as part of daily recording activities.

b. Where the rubbish restricts the Contractor from completing the required services, the Contractor must provide the details of the location and the works not completed to the Network Business in the weekly report as per section 10.2.1.

c. The Contractor is not required to remove dumped rubbish as part of this Contract.

6.9.3 Bio Security

a. The Contractor is required to conform to the requirements of the relevant Environmental Procedures of the Network Business:
   - Environmental Procedures (NUS174) and Environmental Procedures Supplementary Notes – Environmental Handbook for Construction and Maintenance (NUS 174C) and all referenced documents within.

b. This includes the management of the spread of noxious weeds in accordance with The Noxious Weeds Act (administered by the Department of Primary Industries) that regulates the protection of native plants and requires the appropriate management of noxious weeds.

c. The Contractor must ensure that they have appropriate measures to control the spread of weeds which may include:
   i. the establishment of entry and exit points away from weed infested areas,
   ii. minimising the vehicles and equipment brought to the site to reduce opportunity for spread,
   iii. ensuring boots, vehicles and equipment are free of soil and disinfected with solutions containing ‘benzalkonium chloride’ such as ‘Pine-O-Clean’ or 70% methylated spirits prior to entering or leaving bushland,
   iv. cleaning all components of vehicles and machinery including radiator, engine, cabin, tray, attachments, guards and plates,
   v. choosing clean down sites close to infested areas, away from water courses, which are relatively flat and where contaminants will be contained,
   vi. where possible, scheduling works to start in relatively weed free areas to prevent weed dispersal,
   vii. avoid unnecessary movement in weed infested areas, and
   viii. disposal of weeds to an appropriate landfill.

7 GENERAL WORK REQUIREMENTS

7.1 Code of Conduct

The Contractor is responsible to ensure that all Contractor Personnel abide by the Network Business Statement of Business Ethics.

7.2 Conduct of Contractor Personnel

a. **Contractor Personnel Staff Dress**
The Contractor must ensure Contractor Personnel are cleanly, appropriately and neatly dressed and carry identification as a Contractor for the Network Business. The Network Business may request that certain clothing not be worn if its opinion is that such clothing is offensive or interferes with the public image of the Network Business.

b. **Contractor Personnel Conduct**
The Contractor is responsible for the maintenance of good order and conduct among Contractor Personnel while they are engaged in delivering the Services. If any staff member is deemed, in the opinion of the Network Business, to be displaying or has displayed unsuitable conduct, the Contractor, if instructed to do so, will withdraw and replace the staff member without delay or cost to the Network Business.

c. **Contractor Personnel Vehicles and Plant**
The Contractor will ensure that vehicles and plant are easily identified by the application of signs, as approved by the Network Business, identifying the Contractor.

d. **Contractor Personnel Advertising**
Contractor Personnel must not use the carrying out of the Services as a means to solicit any other work.

7.3 Customer Satisfaction

The Contractor must ensure that all Contract Personnel are courteous to all members of the public and any other Company or business or authority representatives with whom they come into contact with and the Contractor must ensure that all enquiries are dealt with promptly.

7.4 Complaints

a. The Contractor is responsible for investigating and resolving any enquiry or complaint by a member of the public, or any Authority arising from the delivery of the Services.

b. Within 24 hours of being notified of a complaint by either the customer or by the Network Business, the Contractor must:
   i. attend to the complaint and propose an action plan to rectify the problem,
   ii. take all reasonable steps to obtain the complainant's agreement to the proposed actions and the timing of those actions, and
   iii. notify the Network Business of the agreed method for resolving the complaint.

c. The Contractor is required to have a formal complaints system to register complaints indicating name, address, complaint, date logged on and off.

d. The Contractor must notify the Network Business as soon as possible after the complaint has been rectified and the customer has confirmed satisfaction with the outcome. All reasonable steps must be taken to resolve the complaint within 48 hours of receiving a notification.

e. All complaints that remain unresolved after 48 hours must be reported to the Network Business, together with the reason(s) for the delay. When applicable, a new action plan must be issued after agreement has been obtained from the complainant. It is the Contractor's responsibility to ensure the timely rectification of all complaints within 7 days of receipt. In addition, all outstanding complaints must be reported monthly to the Network Business as part of the KPI reporting.

f. The Contractor must refer any matters, which cannot be reasonably agreed upon or any complaint that cannot be reasonably resolved with a property owner, resident or manager to the nominated Representative(s) at the Network Business.

g. The Contractor is responsible for all cost associated with resolving Customer enquiries/complaints arising from delivering the Services.

7.5 Noise

a. Objections to the noise of plant and equipment including but not limited to chainsaws and wood chippers will be treated with courtesy.

b. People who object to the noise should be advised of the anticipated length of time of the chainsaws/chipping operation and asked to bear with the temporary inconvenience. If, however, the objection is maintained due to any legitimate reasons, then the work must cease until a more appropriate time can be negotiated, or alternative more suitable arrangements invoked.

7.6 Care for Other NNSW Participant Supplied Materials

a. The Contractor is responsible for the care of materials supplied by the Network Business and must maintain up to date records of all material supplied by the Network Business which also includes data entry devices, induction cards and keys.

b. The Contractor must immediately notify the Network Business in writing if materials are lost, missing or damaged during the Contract and when Contract Personnel have ceased to be employed by the Contractor. The materials must be returned to the Network Business within two weeks of their ceased employment.

c. A statutory declaration for lost, missing or stolen Network Business material must be supplied with a detailed description of the reasons and cause of the event.

d. Any damaged, missing or lost materials will be the sole responsibility of the Contractor without reasonable cause and the costs will be recovered by the Network Business.

7.7 Damage to Property

a. The Contractor is solely responsible for the cost of all repairs resulting from any damages attributed to work by Contractor Personnel during the course of the work. This includes but is not limited to damage to such items as vehicles, water mains, drains, roads, footpaths, gates, culverts, grids, fences, letter boxes, electric power mains and equipment, switchboard equipment including commercial and household appliances, and telephone lines.

b. The repairs must be carried out to the satisfaction of the Network Business, the property owner or the authority/utility concerned, with time being of the essence.

c. The Network Business reserves the right, in the event of any such damage not being

repaired, replaced or otherwise rectified in a timely manner as determined by the Network Business to arrange for damage to be rectified. The Network Business will deduct the cost of any such work from any moneys that may be due the Contractor, or alternatively charged direct.

7.8 Communication of Abnormalities or Defects

If during the performance of the Services the Contractor becomes aware of any abnormalities or defects associated with the Electricity Network, the Contractor must notify the Network Business as soon as possible.

7.9 Working Hours

a. To achieve the maintenance objective, all work, with the exception of Emergency Work, should generally be carried out between the hours of 7.00 am and 6.00 pm Mondays to Fridays and between 8:00 am and 1:00 pm Saturdays. The Contractor's working hours on major roads and in heavy pedestrian traffic areas, such as highways and shopping centres, must be adjusted to comply with conditions imposed by traffic restriction signs, any special restrictions imposed by the local authority and the availability of access. This may include work arrangements outside normal working hours. The Network Business accepts no responsibility for penalties or additional costs incurred by the Contractor in meeting these requirements.

b. Work after 6 pm Monday to Friday, after 1 pm on Saturdays and on Sundays or public holidays, may be allowed with the approval of the Network Business. Such approval must be obtained at least within the week before work is to be carried out.

c. The Network Business may pay reasonable additional costs for approved work carried out on Sundays or public holidays. The additional cost details are to be supplied in full to the Network Business for approval prior to commencing the work. All other out of hours costs will be borne by the Contractor.

7.10 Contractor Identification

a. Contractor Personnel must carry identification associating the individual with the Contractor. In addition, the Contractor's Company Logo/Name must be clearly displayed on all the Contractor's vehicles/plant and protective clothing, at no cost to the Network Business.

b. It is required that Contractor Personnel carry identification and certificate of authority identifying them as Contractors of the Network Business and produce this identification upon request by the public, the Network Business or any other person of Authority. The Network Business will pay for the initial individual employee's identification, however should this identification require replacement thereafter the Contractor will pay for the replacement identification.

c. Whilst work is in progress the Contractor must obtain and display a sign or signs clearly identifying the Contractor at the worksite. This can be satisfied with a sign approved by the Network Business stating the following:
    - Contractor company name
    - Contractor address,
    - Contractor business phone number, and
    - Contractor 24 hour emergency contact number.

d. The signs must be prominently displayed at the extremities of all works in progress or

mounted on vehicles in such a way as to be clearly visible at all times from the rear and the kerb side of the vehicle.

e. The Contractor must obtain approval from the Network Business for the proposed work in progress signs before work commences and/or signage display.

f. Works in progress signs must only be displayed when carrying out the delivery of the Services and must be covered or removed at all other times.

g. The Network Business may provide three different templates for required signage:
   - A template for the rear of a vehicle or plant
   - A template for the door of a vehicle or plant
   - A template for a sandwich board style sign.

7.11 Contractor Information Systems Requirements

7.11.1 Network Business Specific Requirements

a. Use of the Network Business' SAP system:
   i. The Network Business' SAP system records data related to the construction and maintenance of the Overhead Electricity Network, including a provision for notifying locations where vegetation is interfering with the network and customer complaints.
   ii. The Network Business will provide the Contractor with access to the Network Business' information systems in accordance with clause 9.5.

b. Daily SAP interrogation:
   i. The Contractor must interrogate the SAP system daily and must attend all locations where vegetation has been recorded as interfering with the network. The Contractor will then prioritise the remedial work as recorded in SAP and complete all works within the term nominated.
   ii. Vegetation nominated as being in contact with the mains must be attended to immediately. Once the situation has been rectified, the Contractor will update SAP by closing off the work record or alternative arrangements can be organised through the nominated Contract Inspector.

c. SAP data entry:
   The Contractor is responsible for the accuracy of all the data entered into the SAP system. Any incorrect information entered by the Contractor will be corrected at the Contractor's cost.

7.12 Extreme weather conditions

The Contractor must exercise caution and provide services at their own discretion in accordance with their company policy and procedures in the event of extreme fire danger or extreme storm activity and comply with any additional requirements that may be required by the Network Business.

The decision to continue normal working activities during extreme fire conditions will be dependent on individual circumstances including a minimum of location of works, machinery requirements, air temperature, and wind conditions and the nature of the work being completed. The pre-work hazard assessment shall specify the risks and risk mitigation strategies in place

The Contractor must contact the Network Business immediately when the decision to

cease daily operations due to extreme weather conditions is finalised.

In cases where risks can be mitigated and Contractors continue to perform the Services, the Contractor will be required to complete a pre-work hazard assessment, as per section 4.1.6.

During the course of the Contract the Contractor must allow twenty days per annum where work may be disrupted or restricted (e.g. total fire ban days or inclement weather) when preparing allocating resources schedules for the work.

8 GENERAL SITE REQUIREMENTS

8.1 Quality, Safety and Environmental Site Documentation

The Contractor must ensure the following are developed, documented, implemented and at all times readily available for inspection at all work sites where required under the Specification:

a. Contract specific quality, work health and safety and environmental management plans,
b. safe work method statement/s,
c. current version of the Electrical Safety Rules in each of the Network Businesses,
d. hazardous substances register,
e. material safety data sheets for all hazardous substances used on site,
f. relevant induction cards and ESI skills passports,
g. NNSW Vegetation Management Common Requirements,
h. all relevant permits, licenses, exemptions required to carry out the work, and
i. any other documentation as required by the Contract.

8.2 Access to Site

a. The Contractor acknowledges:
   (i) In order to carry out its obligations under the Contract, the Contractor must access land in addition to Network Business property including but not limited to Crown Land and Crown Roads, Council owned and controlled land including roads and footpaths, private property and land owned by any Authority (**Premises**);
   (ii) It is the sole responsibility of the Contractor to arrange access to Premises and any necessary approvals for access to Premises before entering onto Premises.

b. The Contractor is required to liaise with any affected Authority to enable the work to be carried out safely with as little inconvenience as possible to the public.

c. The Contractor must comply with all reasonable requests of the Land Controllers. This includes following the requirements of any negotiated agreements between the Network Business and the Land Controller. Where keys, inductions or site specific requirements are necessary to gain access to work sites on Premises, the Contractor must make arrangements with the Land Controller.

d. Problems in gaining access to Premises must be referred to the Network Business only after reasonable attempts to gain access have been made by the Contractor. When leaving the Premises, gates must be left in the position found upon entry (i.e. either opened or closed). Where multiple padlocks are used to lock a gate the Contractor must ensure that all padlocks remain in sequence and are able to individually unlock the gate.

e. Please refer to Appendix A for specific access requirements.

f. The Network Business will not be liable for any delays the Contractor experiences in gaining access to Premises, as the Contractor is fully aware of the responsibility to gain access rests with the Contractor, not the Network Business.

g. Should the Contractor in error trim or remove any vegetation/tree without the required approvals/agreements, the Contractor will be responsible for all costs resulting from such an error, including rectification, remediation and compensation.

8.3 Notification Process

a. Where Network Business assets are situated on private property or where trees on private property are required to be trimmed as per the Services, it is the responsibility

of the Contractor to advise the resident/occupiers before entering such private properties and negotiate any terms of access to private property.

b. Where access to private property is required, at least two weeks and no more than four weeks prior to work commencing, the Contractor must notify the occupant of the private property via a letter box drop or attachment to a structure (such as a gate or fence) closest to a residence on the premises, of the intention to access their property to cut vegetation. The letter must be based on a pro forma to be supplied by the Network Business, nominate a date range of no more than 3 consecutive days and ask the resident to notify the Contractor immediately if they do not consent to the requested access.

c. If required by the Network Business, a copy of the relevant Network Business brochure is to be included with the required notification letters.

d. On entry to the private property, the Contractor is required to attempt to contact the resident to confirm that entry to the property is convenient prior to commencing work. If the resident is not home, the Contractor is to proceed with the work.

e. If the resident will not consent to access by the Contractor to work, the Contractor must make every reasonable effort to negotiate access and explain why it is necessary to manage vegetation. If the resident still refuses access, the matter should be referred to Network Business for assistance. This should only take place after the Contractor has exhausted all reasonable alternatives to obtain a satisfactory outcome without compromising the required outcomes of the Services.

8.4 Removal and Disposal of Cut Materials (Vegetation)

a. The Contractor is responsible for the disposal of all cut materials. The Contractor must ensure all vegetation management by-products are recycled/ reused where ever possible and only treated as waste after all other options have been considered. Refer Waste Avoidance and Resource Recovery Act 2001.

b. In rural areas all cut material must be removed from the work site within three business days of being cut. In urban areas all cut material must be removed from the work site no later than the same business day as cut.

c. Should the cut material not be able to be disposed of within the specified period due to abnormal circumstances the Contractor must report and seek approval from the Network Business.

d. Any cut vegetation which is not reported and approved, and not removed within the required timeframe may be removed by the Network Business. The full costs of removal and disposal will be charged to the Contractor.

e. The disposal of any materials must be in accordance with relevant environmental protection legislation and appropriate records kept of the volume of vegetation cuttings generated from the work and the volume of vegetation cuttings generated from the work that have been recycled.

f. Where possible, any cut vegetation may be mulched and disposed of on bushland Access Tracks owned by the Network Business by evenly spreading the mulched vegetation over the track.

g. In some locations it may be possible to brush matt and retain cut material along Access Tracks or within Easements in a way that it does not contribute to ignition risk. This will only be allowed with the prior permission of the property owner or controlling

authority, written approval from the Network Business and in accordance with environmental requirements. The Contractor will be responsible for any costs of remedial work, including the removal of the material, resulting from not complying with conditions imposed by any agreement allowing cut material to remain at the worksite.

8.5 Access to Substations and Other Assets to Maintain Overhead Lines

When vegetation to be cleared is located in the proximity of a substation or similar area controlled by the Network Business, the Contractor must request the Network Business to provide access to this area at least 14 days prior to the work being carried out. All Contract Personnel entering the site are to be accompanied by an authorised person. At no time must the Contractor enter or remain at these sites without being under the direct control of the person nominated by the Network Business.

8.6 Supply of Keys

a. Where required the Network Business will provide keys for access to the assets. The Contractor will be required to:
    i. nominate Contract Personnel to be issued authorised keys for access to the network,
    ii. provide an accurate register of key holders,
    iii. return the keys at the end of the Contract,
    iv. immediately report any loss of keys, and
    v. ensure all key holders are aware that the keys are to be solely used for the delivery of the Services and the seriousness of the misuse or loss of the keys.

b. The Contractor is responsible for all keys issued by the Network Business and must ensure their safe keeping at all times.

The security of the network is of vital importance and missing or lost keys will be charged to the Contractor at the rate of $100.00 (one hundred dollars). Further action may also be taken against the Contractor and Contract Personnel involved.

9 DIRECT SERVICES

9.1 Vegetation Management Requirements

9.1.1 Vegetation Maintenance Services

The contractor is to nominate a performance cycle for the delivery of the Initial Cut and ongoing maintenance of compliance of the Overhead Electricity Network with the VMCR document for the remaining term/s of the contract. The length of the performance cycle is to be optimised to maintain Minimum Vegetation Clearance compliance for the period between performance cycle cuts. In determining the length of the performance cycle, consideration must be given to the application of appropriate regrowth allowance while maintaining stakeholder and community expectation. If vegetation fails to meet this requirement, defects are to be rectified in accordance with the VMCR prescribed maximum time frames and contractual compliance will be reflected in the contractors' performance KPI's.

Locations in the Initial Cut that cannot meet the requirements of the VMCR document are to be nominated to the Network Business for approval. Where this results from a requirement for network access to isolate or switch the overhead network for vegetation within the exclusion zone, the Contractor is not responsible for maintenance of the vegetation clearance at these specified locations until the Network Business has supplied access to achieve the Minimum Vegetation Clearance. Upon supply of network access by the Network Business and completion of the works by the Contractor, the ongoing maintenance compliance is the responsibility of the Contractor.

In locations where network access is required for an electrical outage or switching of the overhead network during maintenance activities and the Contractor should reasonably have prevented the need for an electrical outage or switching via their maintenance works, the Contractor will be held responsible for the costs of the Network Business in providing the required network access.

Locations that are nominated as an exception to the Minimum Vegetation Clearance nominated in the VMCR document will be assessed by the Network Business within 28 days. Locations that are not considered appropriate by the Network Business to remain within Minimum Vegetation Clearance and can be cleared to the requirements of the VMCR document will be cleared by the Contractor at no additional cost to the Network Business. Approved locations are to be re-assessed by the Contractor for a change in condition within each performance cycle, verified as compliant and submitted for reassessment by the Network Business. In cases where the Network Business' risk assessment indicates a period of assessment shorter than the performance cycle, the Contract is entitled to use discretionary rates for those assessments and resulting works.

Appendix J provide an overview of the protocols and actions for the Network Business and Contractor for key variations to the performance cycle services set out in section 9.1. In the cases not covered by Appendix J or where there is a discrepancy, the written clauses of section 9.1 take precedence.

9.1.1.1 Maintaining Vegetation Clearances

a. Vegetation growing near the conductors must be monitored by the Contractor to ensure that the continued growth of branches does not result in the vegetation growing into the Minimum Vegetation Clearance specified in the VMCR. If vegetation encroaches within the Minimum Vegetation Clearance the Contractor is required to

adhere to the defect prioritisation and rectification requirements in the VMCR.

b. The Contractor is required to supply evidence of Contract compliance with a continuous audit methodology supplied to the Network Business on a monthly basis. At a minimum this is to include reference to each grid with the date of last maintenance completed, current status, last audit date, volume sampled and program date for future audit and programmed maintenance works.

c. Where possible, the Performance Cycle should be aligned to support compliance to the bushfire requirements of the VMCR document.

d. As part of the scope of the Vegetation Maintenance Services the Contractor must consider the early removal of Category 1 vegetation as a long term solution to maintain vegetation clearances where the vegetation is likely to grow within clearance. The removal of Category 1 vegetation must be in accordance with the process outlined in clause 9.1.2.1

e. The following vegetation must be considered for removal:
    i. Vegetation that is growing within two metres of a pole or standard, or attachment on a pole or standard, or vegetation growing within three metres of a steel tower,
    ii. Vegetation that has the primary branch structure located within the specified clearance area and it is considered that the removal of the offending primary branch/es will substantially damage the vegetation,
    iii. Removal of Dead, Dying, Dangerous and Visually Damaged Limbs/Trees

f. Other vegetation may be nominated by the Contractor for removal where the Contractor considers the risk of leaving the situation may pose unacceptable risk to the Network Business.

g. Where tree removal negotiations are unsuccessful the Contractor will be required to maintain the vegetation to the specified clearances or to an agreed position prescribed by the Network Business.

h. If delivering the required clearances has the potential to leave trees in an unsafe condition or if clearances cannot be achieved due to objections from the relevant Authorities, then vegetation needs to be left in a condition as directed by the Network Business.

i. In locations where specific minimum vegetation clearance requirements have not been supplied for spans over 600m in length, the Contractor is to initially achieve the clearances of Table 2 in the VMCR document plus an additional 2m clearance applied for every 100m increment to the span length. The additional 2m clearance is not to be applied to below the conductor. In such cases the contractor is to also escalate the span to the Network Business for assessment. Upon their availability the Contractor will be accountable to achieve the assessed clearances at discretionary rates.

9.1.1.2 Exceptions to Vegetation Maintenance Services

a. Trimming around Service Mains on Private Property: Where vegetation/trees growing on the customer's own property are within minimum clearances, the trimming of the vegetation/trees is the responsibility of that property owner. Where the vegetation/trees encroachment (i.e. a technical trespass or crossed service) to the service wires is located on an adjoining property, then the Contractor after property

owner consultation must as a minimum trim the vegetation/trees to the minimum clearances.

b. Security lights or lights mounted on buildings do not form part of the Services.

c. The clearance of vegetation around Padmount Substations / Switching Stations in Section 8.4 of the VMCR is not a requirement of this Contract.

d. The clearance of vegetation around Zone / Transmission Substations in Section 8.5 of the VMCR is not a requirement of this Contract.

e. The Contracted service provider should make recommendations to the Network Business for options other than clearing vegetation (e.g. line relocation/insulation/underground)for sites:
   i. With high degree of sensitivity or trees of high community value.
   ii. Where ongoing maintenance costs would be significantly higher than typical encountered.
   iii. Where, for other reasons (e.g. difficult access, site dangers, etc.) it may be prudent to consider alternatives in the circumstances.

9.1.1.3 Easement Clearing Requirements

a. For nominated easements the Contractor is responsible for inspecting, assessing easement condition and clearing nominated easements. The easements must be inspected to the requirements of the easement condition based assessment document provided by the Network Business and if required, maintained to the specified width nominated in this Specification using methods proposed by the Contractor and approved by the Network Business.

b. It is recommended that the Contractor aligns the Easement Clearing work with the regular maintenance of the Overhead Electricity Network and the inspection and clearance of Access Tracks.

c. The Network Business is endeavouring to achieve a low ferny, grassy coverage without trees in easements. Grasses less than 1.5 metres in height are not required to be maintained. Therefore, if it is evident after an easement inspection that the easement is absent of trees, excessive overgrowth or vegetation within clearances, this should be reported to the Network Business and there will be no requirement to maintain the easement within that single performance cycle.

d. It is the intention of ground line clearing to remove at ground level and poison vegetation/trees with the ability to grow into the clearance space, that are less than three meters in height and 100mm or less in diameter. Application of herbicides on private lands is subject to written consent from the landowner.

e. The Contractor will supply all machinery, plant and equipment required to undertake the Easement Clearing services. The Contractor is required to determine the appropriate machine and clearing method for each easement.

f. Clearing methods may include the use of large machinery (mechanical clearing) – where approved-, the use of smaller machinery (weed trimmers on steep slopes), the use of manpower (hand clearing where required), herbicide application or other proposed methods.

g. All item/areas that have previously been managed by mechanical equipment (slasher or tritter) must be maintained using this method.

h. Please refer to Appendix C for additional Network Business specific requirements.

9.1.1.4 Access Track Maintenance Requirements

9.1.1.4a Overview of Access Track Maintenance Requirements

a. The Contractor is required to inspect and clear all prescribed Access Tracks of vegetation, in accordance with this Specification and all relevant legislative requirements, on a performance period cycle within each Vegetation Maintenance Area that aligns with the inspection and clearing of nominated easements.

   The Contractor will obtain a sign off from the Network Business on an annual basis, for the proposed maintenance of Access Tracks.

b. Particular attention must be given to the environmental impact of the work, together with the wishes and concerns of property owners/controllers.

c. It is recommended that the Contractor aligns the Access Track maintenance work with the regular maintenance of the Overhead Electricity Network and the Easement Clearing.

d. The majority of Access Track work involves the clearance of vegetation using both mulching and hand clearing techniques. Correct procedures and techniques are to be adopted in order to:
   i. ensure safe work practices and working environment,
   ii. avoid damage to the environment,
   iii. reduce the number of complaints from the public and local authorities,
   iv. reduce the scope for regrowth towards the tracks,
   v. preserve the health and appearance of vegetation in particular trees.

e. The Contractor will ensure that threatened or endangered flora and fauna and sensitive locations are identified and protected.

f. All vegetation actually growing within the clearance zone is to be cut as close to groundline as possible without disturbance to the existing soil. No sharp pointed stumps are to remain. Thick, long grass should be cut to allow safe vehicular access and clear identification of the Access Track.

g. The Contractor must adopt sound arboriculture techniques for the duration of the Contract. The majority of trees are to be trimmed to the requirements of Australian Standard 4373 – Pruning of Amenity Trees. Tip pruning may only be used to cut vegetation with a diameter of less than 50 mm.

h. All trimmed vegetation must be mulched and spread over the tracks, except for noxious weeds.

i. Please refer to Appendix D for additional Network Business specific requirements

9.1.1.4b Access Track Requirements

a. When maintaining Access Tracks the Contractor must generally comply with the defined track dimensions. Where this is not practical due to the degradation of the Access Track or obstacles placed over track to restrict access, the Contractor is to report the matter to the Network Business for further direction. If the Contractor cannot rectify the issue, the Contractor must notify the Network Business providing details of damage/obstructions on the Access Track and the asset number of the nearest pole.

b. Access Tracks are to be cleared to the following definitions:

i. **Access Track – vehicle**
Unless indicated otherwise on the plans, there are environmental constraints or negotiated with the Network Business, vehicles tracks are to be four metres wide, and have all vegetation removed to a height of four metres above groundline.

ii. **Access Track – vehicle turning circles**
Unless a smaller turning circle has been marked on site, there are environmental constraints or variations negotiated with the Network Business, turning circles must have a radius of eight metres and be cleared of all vegetation to a height of four metres above groundline.

iii. **Access Track – pedestrian**
Unless otherwise indicated on the plans, there are environmental constraints or variations negotiated with the Network Business, pedestrian tracks are to be two metres wide and are to have all vegetation cleared to a height of three metres above groundline.

9.1.1.4c Discretionary Access Track Requirements

a. Where the Contractor is required to clear a new Access Track which is not part of the Vegetation Maintenance Services, the following definitions are to be used in providing a quote to the Network Business.

Vegetation clearing will involve either machine or hand clearing or a combination of both:

i. **Machine clearing**
Involves up to two passes of a mulching machine and/or slasher to achieve the required outcome.

ii. **Hand clearing**
Involves the removal of vegetation with a trunk circumference of less than 450 mm at a height of 1 metre from the groundline.

b. The Contractor may be required to carry out Civil Works to existing Access Tracks for access into the work site. All Civil Works will be carried out in accordance with all legislative and property owner requirements and to an acceptable industry standard. The Contractor will be required to provide individual quotes for all civil work, however the Network Business reserves to right to reject the quote and have the work carried out by a third party.

9.1.1.5 Water Crossing Signs

a. The Contractor must ensure that the clearances specified in Networks NSW Vegetation Management Common Requirement (VMCR) are maintained around all Water Crossing Signs within the Contract Area. Expected regrowth should be taken into account so the warning signage remains visible until the next cutting cycle.

b. These signs are identified on the 'Water Crossing Signs' map provided as an information document as listed in the Appendix I.

c. The Contractor must be responsible for obtaining all permits or ensure that relevant permits are in place and work in accordance with all permits and authorities in relation to clearing waterfront vegetation.

9.1.1.6 Notification of vegetation defects around Service Mains on private property

With each performance cycle the Contractor is to identify vegetation defects around service wires on private property between the private property boundary and the Point of Attachment. Vegetation defects are to be supplied in writing to the property owner/occupier on a form supplied by the Network Business. A copy of the form and a spreadsheet listing is to be supplied to the Network Business within the monthly reporting cycle. A certification is to be supplied per reference of the performance cycle stating that all defect notifications have been delivered and that the vegetation clearance of all properties that were not subject to a defect notification meets the requirements of the VMCR document.

Where, in the opinion of the Contractor, the defect poses an immediate hazard, the Contractor is to contact the Network Business representative immediately to advise them of the defect and seek guidance on any emergency/urgent response required. If necessary to prevent public danger, the Contractor is to stand by the defect until the defect is made safe or advised by the Network Business to stand down. If, in order to address the hazard, the Network business advises the Contractor to stand by or trim vegetation which would normally be the responsibility of the customer, the Contractor will be entitled to apply discretionary rates for the work.

9.1.1.7 Electrical Outage / HV CATT Crews

The Contractor is responsible for the provision of all resources, plant and equipment required to maintain vegetation under electrical outage conditions or HV CATT conditions.

The Contractor must provide an indicative number of electrical outage / HV CATT crews for each Vegetation Management Area, comprised sufficiently of qualified and authorised personnel. A core dedicated resource will be negotiated, allocated and paid for in addition to the maintenance value of the Contract.

In some circumstances the Contractor must leverage off the resources available from the maintenance crews to provide any additional resources required for large electrical outage jobs. Where maintenance crews are used during electrical outages, the Network Business will allow the electrical outage / HV CATT crew to work on maintenance work to recover time lost on maintenance activities. The Contractor must allocate the electrical outage / HV CATT crew resources to maintenance tasks when there are no scheduled electrical outages or HV CATT jobs planned.

The Contractor will be required to report each month on the number of electrical outage and HV CATT jobs completed including additional maintenance crews required for electrical outage jobs and the number of days the electrical outage / HV CATT crew completed on maintaining vegetation.

9.1.1.8 Optional inclusion - Vegetation Service Wire Clearing on Private Property

The Contractor is to supply pricing for the inclusion of clearing and maintaining vegetation around Service Mains to the requirements of the VMCR document in conjunction with the initial and maintenance performance cycles of Clause 9.1.1. Inclusion of this option will remove the requirement to comply with Clause 9.1.1.6.

9.1.2 Discretionary services

Discretionary services do not form part of any programmed maintenance activities in other sections of this Specification. All discretionary services will be approved by the Network Business within each of the awarded Vegetation Management Areas.

9.1.2.1 Process for Discretionary services

a. All Discretionary services require Network Business approval prior to commencement. Discretionary services must be completed either outside of maintenance resource allocated hours or by an additional work crew so the Vegetation Maintenance Services are not impacted.

b. The Contractor must identify vegetation suitable for complete removal and notify the Network Business with details of the location and the applicable removal rate from the schedule using the relevant Vegetation Removal Notification form. This form will also be used by the Network Business to advise the Contractor of the actions approved for each notification. Additional Works should be scoped in each area in advance of the planned maintenance activity. Sufficient lead time needs to be allowed to approve the works prior to commencing the relevant routine Vegetation Maintenance Service activity.

c. The Contractor will use the Vegetation Removal Request form to provide the Network Business with the necessary documentation and final request for removal of vegetation. This form will also be used by the Network Business to advise the Contractor of actions approved for each request. The Contractor must provide sufficient evidence of having completed the negotiations in a format approved by the Network Business. The Network Business may decide to participate with the Contractor in any negotiations or negotiate independently.

d. If in the Contractor's reasonable opinion a situation indicates that negotiations will not be successful, the Contractor must refer the vegetation directly to the Network Business and provide a detailed report of the situation and a recommended solution. The Network Business reserves the right to direct the Contractor to negotiate a removal where it considers a successful outcome may be achieved.

e. The Network Business does not guarantee the Contractor any quantity of Discretionary services in any Contract item/areas and has no obligations resulting from any nominations for vegetation removal. The Contractor must achieve and maintain specified clearances of this vegetation as required under this Specification independently on the outcome of the vegetation removal request.

f. Contractor must remove the vegetation at the agreed Discretionary services rate, where the required written approvals are obtained, including the written approval of the Network Business. The Network Business will retain the right to obtain independent pricing on any removal work and to have the work carried out by a third party

g. At times, the Contractor will be required to remove multiple trees under Categories 2, 3 and 4 in one location or to remove multiple trees in close proximity to one another. The Network Business will not pay the individual Discretionary services rate where multiple trees are to be removed and will request individual quotations for multiple tree removals.

9.1.2.2 Scope of Discretionary services

a. The following vegetation must be considered for removal:
    i. Vegetation Hazard Reduction Works, outside of the inspection space (Tier 2 defects as per VMCR).

b. Other vegetation may be nominated by the Contractor for removal.

c. As stumps will not generally be removed, any vegetation removed in conjunction with this Contract must be cut off as close as possible to groundline or in accordance with

an alternative policy of the property owner/controller. However, where the Network Business considers that a stump should be removed, the Contractor must remove the stump by grinding at the appropriate Discretionary services rate, in accordance with clause 9.1.2.4.

9.1.2.3 Customer Negotiations

a. The Network Business can approve or decline a tree removal request. Once a tree removal request has been approved by the Network Business the Contractor must carry out negotiations with the customer for their approval. The Contractor must provide sufficient evidence of having completed the negotiations in a format approved by the Network Business.The Network Business may decide to participate with the Contractor in any negotiations or negotiate independently.

b. All levels of negotiation or consultation must be pre-approved by the Network Business; however, negotiation and consultation costs associated with the removal of Category 1 Vegetation will only be approved in exceptional circumstances. Negotiations will be paid for at the agreed Discretionary services rate, whether successful or unsuccessful.

c. If in the Contractor's reasonable opinion a situation indicates that negotiations will not be successful, the Contractor must refer the vegetation directly to the Network Business and provide a detailed report of the situation and a recommended solution. The Network Business reserves the right to direct the Contractor to negotiate a removal where it considers a successful outcome may be achieved.

d. Where the Contractor has been unable to obtain a successful outcome to an approved negotiation for the removal of vegetation, the Contractor must formally notify the Network Business.

e. Where negotiations are unsuccessful the Contractor will be required to maintain the vegetation to the specified clearances. In these cases, the Network Business will make every effort to resolve the situation.

9.1.2.4 Stump Removal

a. The Network Business will occasionally request the Contractor to remove the stump of all types of vegetation.

b. When requested, stumps must be removed by grinding the stump to 250 mm below the lowest point of groundline around the vegetation. All shavings must be removed from the hole and clean top soil is to be used to fill the hole to groundline (compacted firmly).

c. The removal of the stumps of Category 1 Vegetation will form part of the ongoing Vegetation Maintenance Service requirements in section 9.1.1 and will be at no additional cost to the Network Business. Discretionary services rates will be used for the removal of the stumps of Category 2, 3 and 4 Vegetation. The removal of stumps of any other vegetation will be subject to individual quotations for the cost of removal.

9.1.2.5 Additional and Emergency Resources

a. The Contractor may be required to trim trees, clean up and dispose of tree debris generated, resulting from the following:

   i. **Declared Incidents**
   Such incidents will be declared by the Network Business and would generally

cover major emergency situations such as storms, bushfires and major equipment failures. Discretionary services rates will be used for the work and no additional charges shall apply.

ii. **Other Non-Maintenance Works**
Discretionary services rates will be used for the work and no additional charges shall apply.

b. All rates are to include all associated costs in the provision of this labour and equipment, including applying traffic control signs and cones (not including additional traffic controllers).

c. With the exception of remote areas, once contacted the Contractor must be available at the nominated site within two hours for direction.

d. Should, in the opinion of the Network Business the Contractor fail to adequately respond to the request the Network Business reserves the right to arrange for the work to be carried out by other authorised Contractors.

e. The Contractor must nominate two or more persons who can be contacted by telephone at all times including night time and weekends, during the Term, to deal effectively with works and complaints arising from the works.

f. The Network Business does not guarantee the Contractor any quantity of Declared Incident or other non-program works in any Contract areas.

9.1.2.6 Resourcing

a. In most circumstances, the Contractor must not use resources allocated to Vegetation Maintenance crews to conduct Discretionary services. This work must be completed by authorised external crews or outside of maintenance resource allocated hours.

b. In circumstances where efficiencies can be exploited by the Contractor's maintenance crews conducting Discretionary services, a price reduction reflecting these efficiencies should be considered.

c. The Contractor must balance the resources and reciprocate the time lost by a maintenance crew conducting Discretionary services by providing additional maintenance resources for the time lost.

9.1.3 Access to the Network Business' Overhead Electricity Network

a. Access to work performed on or near the Network Business' electricity supply network is governed by the requirements of the Network Business' Management Plan and particularly, Electrical Safety Rules.

b. It is the Contractor's responsibility to ensure that when work needs to be carried out within the safe working distances stated in the Electrical Safety Rules, arrangements are made with the Network Business to have an access permit issued.

c. When requested, the Network Business must arrange for access to the network, including disconnection, short circuiting and earthing of lines and apparatus, the issue of access permits for the work, the erection of warning notices and, where necessary, the provision of stand by personnel. Work will then be carried out under access permit conditions.

d. Where work is to be carried out under access permit conditions, time restrictions will apply to the Contractor's access to the work site. In such circumstances, work will generally be permitted between 9.00 am and 3.00 pm, Monday to Friday, with the work being arranged so that the powerlines can be re energised each day.

e. Some sections of the Network Business' network can only be interrupted during specific times due to loading requirements and supply agreements with customers. In these situations the Contractor will be required to provide adequate personnel at any time, twenty four hours a day, seven days a week.

f. If it is necessary to re-energise the powerlines in advance of the time arranged, the Contractor must comply with the direction of the Network Business' authorised personnel in order to permit supply to be restored as soon as possible.

g. The Contractor must give the Network Business a minimum of twenty one working days notice of the intention to carry out work where Access Permit conditions apply. Where a large number of access permits are required within a short period or where network constraints limit opportunities to de-energise the network, delays may occur in meeting requirements. Access requirements must be planned well in advance and it is the responsibility of the Contractor to verify the de energising arrangements with the Network Business.

h. The Contractor must provide a minimum of 24 hours written notice when work requiring the issue of Access Permits is to be cancelled. At the discretion of the Network Business, failure to comply with this cancellation notification requirement may result in the cost of providing the access being charged to the Contractor.

i. As the maintenance of supply to the Network Business' customers is of prime importance, no responsibility will be accepted for any loss incurred due to the delay in issuing, non-issue or early cancellation of access permits requested by the Contractor.

9.1.3.1 Testing and Erection of Earth Sets

a. The Network Business will provide adequate Earth Sets at no cost to the Contractor issued at the commencement of the Contract. Every six months the Network Business will test and inspect the integrity of the earth sets and carry out maintenance due to general wear and tear.

b. The Network Business may also provide adequate resources to apply the Earth Sets to the overhead network until such time the Contractor is authorised to carry out this function.

9.1.3.2 Temporary Insulation or Dismantling of the Network

Where the Contractor considers that the low voltage portion of the overhead electricity network should be insulated or temporarily dismantled to facilitate the clearance of vegetation, details must be submitted in writing to the Network Business at least 21 working days prior to the work being carried out. The need to insulate or dismantle the overhead electricity network will be at the sole discretion of the Network Business.

The Contractor will be responsible for the costs incurred by the Network Business as a result of the temporary insulation or dismantling of the network.

9.2 Supervision and Auditing of the Works

a. As part of the Contractor's quality system, the Contractor must develop and provide the Network Business with an audit plan covering self-auditing of vegetation clearance compliance, safety, environment and customer relations aspects of the Services.

   While delivering the Services the Contractor must execute the audit plan and as part of the quality audits, the Contractor is required to continually monitor and audit vegetation to enable appropriate analysis and planning within their area of responsibility.

b. While adhering to the Networks NSW VMCR, the Contractor will be required to determine corrective action for any defect identified by the Contractor or by the Network Business. The corrective action should include the timeframe for completing corrective action, the person/s responsible for carrying out corrective action and the follow up activity to notify the Network Business that the non-compliance has been corrected.

c. It is expected that the level of self-auditing will depend on the service and quality of the Services and may need to increase if poor performance is continually noticed. As a minimum, the network Business expects the Contractor to implement a rigorous audit process to ensure specification requirements are met. The Contractor must record evidence of completing Contract Personnel audits and post work audits and provide details to representatives of the Network Business upon request.

d. The Contractor must ensure that sufficient supervisors are engaged by the Contractor to attend the auditing services to ensure a complete inspection of all the Services.

e. The Network Business requires results of auditing process to be provided in the monthly and biannual vegetation audit reports as required by section 10.2.

f. The Contractor must also sign the audit report as a true and accurate record of the site inspection / post work audit with any agreed outcomes and provide a copy to the appropriate Network Business Representative upon request.

g. The Contractor must nominate two or more persons who can be contacted by telephone 24 hours per day, seven days per week, to effectively deal with emergencies and complaints arising from the Services.

10 INDIRECT SERVICES

10.1 Account Management

The Contractor will provide Account Management resources to meet the strategic, planning, communication, reporting, and incident management requirements of this Specification. The Contractor Personnel will work closely with the Network Business to meet the Direct and Indirect Service requirements.

10.2 Contract reporting requirements

10.2.1 Weekly

a. Details of completed work in the previous week:
   i. Locations of completed work,
   ii. Safety/Environment Performance (Incidents and Corrective Actions), and
   iii. Operational issues (weather, access, industrial activity etc.).

b. Details of planned work in this week:
   i. Locations of planned work.

c. The weekly report is due by 4:00pm on the first business day of each week.

10.2.2 Monthly

a. Monthly KPI Reporting
   i. KPI report
   ii. Rectification plan for KPI gaps
   iii. Details of completed work in the previous month:
      - Vegetation management work (monthly and cumulative)
      - Summary of easement and Access Track (monthly and cumulative)
      - Delivery against program (Planned vs Actual)
      - Field hazards notified and documented
      - Summary report of all safety, quality and environmental audits conducted by the Contractor to ensure Service compliance:
        - Complete copies of each individual audit attached to the summary report
        - Actions taken to correct each non–conformance
   iv. Team compliance statement
   v. Financial/Contractual - Contract Variations
   vi. Continuous Improvement:
      - Project Updates
      - Potential Opportunities
   vii. General Business

b. The monthly reports are due by 4:00pm on the fifth business day of each month.

10.2.3 Annually

Information required as part of the Waste Production and Purchasing Policy (WRAPP) required by the NSW Office of Environment and Heritage within two weeks of the end of the financial year.

10.2.4 Reporting Template

The Contractor must provide the reports required in sections 10.2.1, 10.2.2, 10.2.3 and 10.2.4, in accordance with the Contract Reporting templates (Appendix F – Contract Reporting Templates).

10.2.5 Data Format Requirements

The Contractor is required to supply all data and communication in approved electronic formats.

10.2.6 Data Collection Requirements

a. The Contractor must provide data as a minimum but not limited to, in accordance with the Contract Data Collection template (Appendix G – Contract Data Collection Template).
b. The Data Collection template is due by 4:00pm on the first business day of each week

10.3 Invoicing

10.3.1 Regular Payments

a. **Initial Performance Cycle**
The Network Business will only pay for Initial Cut on completion of the works in each Vegetation Management Area.

b. **Vegetation Maintenance Services**.
Once a Vegetation Management Area has been signed off by the Contractor and the Network Business to be in maintenance mode the Contractor will be entitled to claim a monthly amount pursuant to clause 32.1 of the General Conditions of Contract. The payment will be made on receipt of a correct tax invoice and supporting Contract reporting subject to clause 32.2 and 32.3 of the General Conditions of Contract.

c. **Discretionary Work**
The payment will be made upon the validated completion of approved discretionary work. The payments will be monthly on the receipt of the progress report and receipt of a correct tax invoice.

10.3.2 Defective Works

a. Payments for partially maintained Vegetation Management Areas will not generally be allowed unless the reason for not maintaining the Vegetation Management Area(s) is outside the control of the Contractor and with the reasons endorsed by the Network Business.

b. Examples of reasons outside the control of the Contractor include excessive wet weather or resources being directed from ongoing Vegetation Maintenance Services to fault and Emergency Work by the Network Business.

c. Where work in a Vegetation Management Area is not compliant, because required work has not been completed or work has been completed without the endorsement of the Network Business, the Network Business may withhold part of the amount to be paid under the requirements of clause 25.3 of the General Conditions of Contract.

10.4 Continuous Improvement Initiatives

The Contractor is required to identify and implement continuous improvement initiatives that will improve safety, environment, quality and service delivery. The Network Business will provide reasonable assistance and co-operation in the implementation of such initiatives.

11 CONTRACTOR MANAGEMENT

11.1 Quality Control

During the course of the Contract, the worksite will be continually monitored for compliance with the Contract requirements.

11.2 Monitoring the Contractor's Performance

a. The Contractor's performance will be continually monitored to ensure an acceptable level of performance is maintained throughout the Term and to ensure Contractors are meeting all Contract requirements. The Contractor's performance will be monitored against the Contract requirements and against the Key Performance Indicators (KPIs) provided in Appendix H.

b. Quarterly Reviews will be held to formally review of the performance against the KPIs. The Contractor will be notified by the Network Business at the commencement of the Contract the dates of the Quarterly Reviews.

c. The Contractor's performance will partly determine whether the Network Business will offer the option to extend the Contract, if options are still available, or whether the Contractor will be invited to tender for future Services.

11.3 Monthly Assessment and Reporting of Contractor Performance

a. The Network Business will complete a quarterly assessment of reported KPIs. The monthly assessment and reporting of the Contractor's performance will form part of the overall Service compliance and will provide evidence of satisfactory or unsatisfactory performance. The report must be reviewed in context against the number of worksite observations completed for the month and the seriousness and or repetition of non-conformances.

b. The Network Business will use the KPI scores to track performance across the Term against established service levels.

c. If the Contractor's Representative disagrees with the report outcomes, the Contractor must arrange a meeting with the Network Business to discuss the report. After this is completed, the final report outcomes will be at the sole discretion of the Network Business.

11.4 Access to Information

11.4.1 General Requirements

The Network Business may choose to undertake one or more LiDAR (Light Detection and Ranging) surveys during the Term. The Network Business will provide all details of the LiDAR vegetation audit to the Contractor.

11.4.2 Network Business Specific Requirements

a. The Network Business will provide a desktop computer for the purpose of carrying out the work under the Contract, the computer must not be used for any other purpose.

b. The Network Business maintains an electronic system which records data related to

the construction and maintenance of the Network Business' Electricity Network in SAP.

c. The Network Business will provide authorisation, training and support in the use of all relevant network computer systems to the Contract.

d. The Network Business will supply one ADSL connection or equivalent to the Contractor's premises to enable access into the Network Business' information network. If the Contractor's premises are in a location where ADSL access is unavailable, the Contractor must supply an alternative connection at their costs.

e. In the event that the Contractor relocates their premises, the Contractor will be responsible for reconnection to the ADSL network.

11.5 Not Used

APPENDIX A – SPECIFIC ACCESS REQUIREMENTS

Not Used.

APPENDIX B – EXCEPTIONS TO REQUIRED CLEARANCES

Not Used.

APPENDIX C – ADDITIONAL EASEMENT CLEARING REQUIREMENTS

C.1 Specific Easement Clearing Requirements

C.2.1 Machinery Requirements

a. Equipment, plant and machinery supplied by the Contractor will include:
   i. tractor(s)
   ii. slasher(s)
   iii. fuel trucks/support vehicle(s)
   iv. brush cutter(s)
   v. chain saw(s).

b. Tractors with line clearing equipment must be suitably equipped with heavy duty slashers, tritters or flail mowers in addition to a suitable front blade and must be able to demonstrate their effectiveness for the Easement Clearing work required.

c. The equipment must be suitable to remove saplings up to 150 millimetres in diameter. All plant is to be supplied with an operator or driver with the appropriate licences.

d. The Contractor is required to operate and move all machinery in accordance with the Environmental requirements in section 8.

C.2.2 Easement Clearing Specifications

a. The Contractor is responsible for inspecting and clearing nominated easements with the works to be completed in each single performance cycle, subject to weather conditions. Easements are to be cleared to a width determined by the type of feeder. The table below outlines the required easement widths:

Nominal voltage	Typical width of easement
low voltage 10 m	5 m each side of pole line
11,000 volt 15 m	7.5 m each side of pole line
33,000 volt 20 m	10 m each side of pole line
66,000 volt 20 m	10 m each side of pole line
132,000 volt 45 m	22.5 m each side of centre line

b. Widths are measured from the centreline of the overhead line. The widths nominated in the table above are in accordance with widths nominated in AS 7000:2010 Design of Overhead Lines.

c. There are some cases where current easement widths are wider than the required widths nominated in the table above. In these cases, the Contractor must ensure the new widths align with the requirements outlined in the table above. Unless authorised by the Network Business, the Contractor will not be paid for clearing easements to widths wider than the nominated width or for clearing the wrong vegetation.

d. There are some cases where established vegetation is within the nominated widths identified in the table above. This could be due to the line construction or environmental constraints. In these cases, the Contractor must immediately notify the Network Business and seek further instruction.

e. The Contractor is required to remove all vegetation but is not required to slash grass.

C.2.3 Personnel Requirements

The Contractor is required to supply all operators, labourers and supervisors required to

undertake all Easement Clearing activities.

C.2.4 Hand Cutting, Herbicide Application or Other Approved Methods

a. Significant areas of the nominated easements may not be able to be accessed with machinery and therefore has to be cleared using hand cutting methods, herbicides or other approved methods.

b. Were Vegetation is to be left for an extended period of time, Vegetation must be cut in one metre lengths (maximum) and stacked neatly where it will not cause a safety hazard.

APPENDIX D – ADDITIONAL ACCESS TRACK REQUIREMENTS

D.1 Gate Installation

a. The Contractor may be required to supply and install gates to restrict access to Access Tracks and other Network Business assets. These gates are to be installed into the existing fence line using 100 mm HD galvanised steel with welded ribs below ground. The gate assemblies must be a Warwick Gate assembly or equivalent as the minimum standard. The stays must be sprigged into the ground before concreting over. The posts must have K100 caps fastened to the posts and, to ensure the long term stability of the gate, are to be buried sufficiently in the ground with the post concreted in for the full depth of the hole.

   i. **Gate – large**
   A gate to suit a 4800 mm opening as follows:
   Field Gate - 4770 mm wide x 1170 mm high, made of a high tensile 33.7 mm OD frame and 33.7 mm 'N' brace, covered in 100 mm x 200 mm x 5 mm galvanised weldmesh mat to fit a Warwick Gate assembly or equivalent, complete with hinges, support posts, braces, fencing, post chain and closure.

   ii. **Gate – small** (standard)
   A gate to suit a 3600 mm opening as follows:
   Field Gate - 3570 mm wide x 1170 mm high made of a high tensile 33.7 mm OD frame and 33.7 mm 'N' brace, covered in 100 mm x 200 mm x 5 mm galvanised weldmesh mat to fit a Warwick Gate assembly or equivalent, complete with hinges, support posts, braces, fencing, post chain and closure.

b. The post chain and latch are to be welded onto the gate so that it remains in place when detached from the supporting post. All welds are to be coated with galvanised paint.

c. Where there is an existing gate, the original support posts may be used as long as the post is structurally sound and meets the installation requirements. If the support posts cannot be used it is the Contractor's responsibility to remove the existing support posts and install the new posts in the existing fence line.

d. Where gates are installed into an existing wire or wooden fences, they are to be fitted into the existing section layout of the fence, where possible. Wire strainers are to be installed on the wire fence to maintain the integrity of the fence.

e. In some instances minor fencing work will be required. This will involve the erection or repair of one span of fencing either side of a gate. Each span will consist of three evenly spaced strands of 1.67 mm galvanised barbed wire, supported by a galvanised star picket at one end and the gate support post at the other.

f. It is the Contractor's responsibility to identify all underground services in the vicinity of the work area and to avoid any damage to those services.

g. In some instances, property owners may require an alternative style of gate posts or gates in keeping with the aesthetics of their property or the gate must be upgraded to a heavy duty National Parks style gate. This will only be allowed subject to a satisfactory quote and with written approval from the Network Business.

h. The Network Business will have the final say on the adequacy of the gate installation.

D.2 Installation of Padlocks

The Network Business will provide specified padlocks that are to be installed using 12 mm galvanised chain firmly fitting around the gate and support post. Where other locks are present, padlocks are to be placed individually between links with at least three links between each padlock.

APPENDIX E – TRAINING MATRIX

APPENDIX F – CONTRACT REPORTING TEMPLATE

APPENDIX G – CONTRACT DATA COLLECTION TEMPLATE

APPENDIX H – KEY PERFORMANCE INDICATORS

APPENDIX I – WATER CROSSINGS MAP

APPENDIX J – Exceptions Summary and Process Table

APPENDIX K – VEGETATION MANAGEMENT COMMON REQUIREMENT (VMCR)

ISSC 3
GUIDELINE FOR MANAGING VEGETATION NEAR POWER LINES

Integrating Community, Safety and Environmental Values

December 2005

INDUSTRY SAFETY STEERING COMMITTEE (ISSC) GUIDELINES

In New South Wales, statutory safety requirements for electricity transmission, distribution and utilisation are contained in the Electricity Supply (General) Regulation 2001 and the Electricity Supply (Safety and Network Management) Regulation 2002. The Network Management Plans and other Safety Plans required under the latter regulation are prepared by the five NSW Network Operators. The regulation specifies the safety outcomes to be achieved. The means of achieving those outcomes are matters to be determined by each Network Operator.

The NSW electricity supply industry has traditionally published an extensive series of guideline documents. These set out the industry's view of minimum practices, which would enable an organisation, or individual, to fulfil the regulatory requirements.

Whilst compliance with the Plan is mandatory, organisations or individuals may choose to depart from the recommendations of the guides provided that the necessary duty of care is exercised and the regulatory requirements are fulfilled.

REVISION HISTORY

This Guideline was first published by the Department of Minerals and Energy as the "Guidelines for Tree Planting and Maintaining Safety Clearances Near Power Lines". The Electricity Council of New South Wales updated the Second Edition 1990 in February 1992: "Guide to Tree Planting and Maintaining Safety Clearances Near Power Lines - EC 3".

The Electricity Association of NSW (EA of NSW) published a revised guide ISSC3 on behalf of The Industry Safety Steering Committee (ISSC) in October 1996. A further review was conducted in 2001 under the auspices of the EA of NSW, but that review did not reach the publication stage.

In July 2002, the Minister for Energy reconstituted the ISSC following the 'winding up' of the EA of NSW, and the newly formed ISSC, under the secretariat and chairmanship of the Department of Energy, Utilities and Sustainability, conducted this latest revision.

DISCLAIMER

While due care has been exercised in the compilation of this Guideline, much of the content has been sourced externally to the ISSC and the Department of Energy, Utilities and Sustainability. Thus the Department of Energy, Utilities and Sustainability cannot accept responsibility for the content.

This Guideline is designed on the basis that it will be used in its entirety, and persons who use or observe parts of the publication without paying heed to the entirety of the publication do so at their own risk.

This Guideline has been prepared on the basis that the user will be appropriately trained, qualified, authorised and competent. This Guideline is not intended for use by untrained or unqualified persons, and anyone in that category using the guide does so at his/her own risk.

This Guideline does not purport to ensure compliance with all relevant statutes and regulations, such as occupational health and safety laws. Users must satisfy themselves as to the requirements of all relevant laws.

PREFACE

This Guideline was reviewed by a Working Group of the Industry Safety Steering Committee of New South Wales (ISSC), and has been prepared for the benefit of the Community, Network Operators, Service Providers, Local Councils and other Government agencies.

The Working Group included representatives from many stakeholders, including the NSW Network Operators, the Department of Energy, Utilities and Sustainability, Department of Local Government, WorkCover, the NSW Heritage Office, Local Government and Shires Associations of NSW, the Electrical Trades Union and Local Councils.

NSW Network Operators and the community recognise the value of trees in the landscape. Trees and vegetation therefore should be retained wherever appropriate. This guideline will provide options in the management of vegetation primarily aimed at the long-term harmonious co-existence of vegetation and overhead power lines.

The Network Operators have an ethical, business and statutory obligation to keep their electrical assets safe and operable. To meet these obligations, vegetation near electrical assets requires management in order to maintain the safe and reliable operation of the electricity network. A reliable and safe power supply underpins the economy of NSW and our community life.

It is recognized that the management of vegetation in the vicinity of power lines can be a sensitive and emotional issue with the community.

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OBJECTIVE

Safety and environmental management is of concern to, and the responsibility of, all members of society including individuals, community groups, special interest groups, private sector and public sector organisations. The management of vegetation near power lines is a critical environmental and safety issue for the community. The responsibility for vegetation management near power lines does not lie solely with the electricity industry and this is reinforced in the current NSW legislation that sets out the responsibilities of network operators, owners of private property and others for the management of trees near power lines.

This document seeks to provide guidance to network operators and the community generally in the safe and environmentally responsible management of vegetation near power lines by integrating community, safety and environmental values.

SCOPE

This guideline applies to any vegetation management work conducted near existing electricity assets. Community, safety and environmental values covered include:

- public and employee health and safety;
- the separation required between vegetation & electricity assets to ensure a safe environment;
- other relevant NSW and Federal codes, standards, legislation and regulations;
- the application of sound horticultural practices in vegetation management work;
- the protection of all assets, including trees, from unnecessary damage;
- the reduction of fire risk caused by contact of vegetation with electricity assets;
- the methods of restricting future planting of inappropriate vegetation and
- advice on development of tree management plans.

The requirements for the establishment of new overhead power lines are addressed in industry guide *"Guidelines for the Development of Electricity Systems Community and Environmental Considerations"* (ISSC22). The requirements regarding the maintenance of electricity easements are addressed in industry guide *"Guidelines for the Management of Electricity Easements"* (ISSC20).

In reviewing and further developing this guideline, the working group has considered the following:

- the current Australian standard for pruning amenity trees AS 4373-1996;
- practices in other States;
- other relevant NSW codes, standards and legislation;
- maximising the reliability of the electrical network;
- the principles of environmentally sustainable development and responsible environmental management;
- the 'essential service' function of the electricity network and the need to maximise its reliability;
- vegetation management requirements in relation to heritage areas and heritage listed, significant, protected and private trees and
- the need to enhance community awareness of the issues surrounding vegetation management and electricity assets.

APPLICATION

This guideline shall be read and applied in conjunction with any other codes, guides, standards and legislation relevant to NSW.

DICTIONARY

For the purpose of interpretation, the following definitions apply:

* Means consent or permission is usually required from the appropriate authority to prune/remove trees listed/protected under these provisions. Early contact should be made with the appropriate authority to clarify any necessary prior approvals and information required before proceeding with works.

Aerial Bundled Cable (ABC)	Two or more cores twisted together into a single bundled Cable assembly. Two types of aerial bundled cable are used: • Low Voltage Aerial Bundled Cable (LVABC) – means a cable which meets the requirements of *AS3560*. • High Voltage Aerial Bundled Cable (HVABC) – means a cable which meets the requirements *of AS3599 Part 1 or AS3599 Part 2*
Clearances	Refer to Clearing Space or Inspection Space.
Clearing Space (Minimum Safety Clearance)	Space surrounding the overhead power line conductors and other electrical equipment, which is to be maintained clear of any foliage. The extent of this space is dependent on the maximum sag, the voltage of the conductors, the regrowth characteristics of the trees, the period till the next planned inspection, and type of power lines.
Covered Conductor	A conductor around which is applied a specified thickness of insulating material. *AS3675* specifies two types of covered conductor: • CC where the nominal covering thickness is independent of working voltage. • CCT where the nominal covering thickness is dependent on the working voltage.
Customer Connection Service	Means any of the following services: a. The connection of any premises to an electricity distributor's distribution system, or b. An increase in the maximum capacity of any premises' existing connection to an electricity distributor's distribution system.
Electricity Asset	Any component of the electricity transmission or distribution network. Assets typically relevant to vegetation management are overhead lines, poles, towers, substations, access tracks, streetlights, warning signs, etc.
Electricity Distributor	This term also refers to and can be read to mean Energy Distributor.
Energy Distributor	A corporation constituted by the *Energy Services Corporation Act 1995* whose corporate name is listed *in Schedule 1 of the Act.* For the purposes of the guideline the term applies to Country Energy, EnergyAustralia, Integral Energy and TransGrid.
Environmental Factors	Those components of the environment that are to be considered concerning the impact of activities on the environment. The factors are prescribed in the *Environment Planning and Assessment Regulation 2000 Part 14 Division 1.*

Fire Hazard Area	An area where, in the opinion of the delegated officer of the electricity distributor in consultation with bush fire management committees established under *the Rural Fire Service Act 1997*, or representatives of the Rural Fire Service, and the local council, the combination of the normal build up of vegetation, excessive fuel levels and general weather conditions in the area would constitute a high probability of extending a fire ignition into a large fire or potential to increase the probability of damage to electricity assets from a fire.
* Heritage Listed Tree	Means any tree listed as having heritage value to the local area or to the state either individually as an item or as part of a group (e.g.: street trees, avenue, group) on any of a Local Government Authority's Local Environmental Plan or a Regional Environmental Plan (including exhibited draft versions) made under *the Environmental Planning & Assessment Act 1979*, on the State Heritage Register, or subject of an Interim Heritage Order or subject of an order made under *section 136 of the Heritage Act 1977*. Heritage listing of a property containing one or more trees deems that tree or trees to also be heritage listed or to have heritage value. Properties with trees may be listed individually as items or collectively as heritage conservation areas. Trees may be part of a larger place listed as a heritage item, area or heritage conservation area (for instance street trees within a conservation area, or an avenue of trees within a park or reserve).
Inspection Space	Space additional to the clearing space in which further clearing may be required where, in the opinion of the delegated officer of the electricity distributor, a part of a tree constitutes a serious hazard to bare or insulated aerial conductors or other electrical equipment under extreme storm or wind conditions.
Insulated Aerial Conductors	Aerial conductors which are continuously covered with fully rated insulation material of the appropriate grade of the voltage at which the overhead line is operated.
Local Councils	The councils constituted pursuant to *the Local Government Act 1993*.
Natural Tree	Tree(s) that have grown by natural seeding.
Network Operator	The holder of an Electricity Network Operators licence as provided for under NSW legislation. There are currently five NSW Network Operators: - EnergyAustralia, Integral Energy, Country Energy, TransGrid and RailCorp.
Non Urban	The areas outside urban areas.
Overhead Power Line	An aerial conductor together with towers, poles, insulators, hardware, cross arms, substations or other associated electrical equipment erected or in the course of erection for the purpose of supplying electricity.
Planted Tree	Tree(s) other than those that have grown by naturally seeding.
Private Overhead Line	Any electricity assets on private property beyond the "point of supply" of the network operator. These lines can be of any voltage, insulated or otherwise, and are the responsibility of the landowner/occupier.
Private Tree	Tree(s) on private property that are either natural or planted.

Protected Area	Means any area within a national park or nature reserve within the meaning of the *National Parks & Wildlife Service Act 1974,* or a. land that is reserved or zoned for environmental protection purposes under the *Environmental Planning & Assessment Act 1979*; or b. a public reserve within the meaning of *the Local Government Act 1993.*
Protected Land	a. land identified on a map a copy of which has been deposited in the office of a district soil conservationist in accordance with section 21B; or b. any land (not being land referred to in paragraph (a)) that is situated within, or within 20 metres of, the bed or bank of any river or lake which (with reference to the Water Act 1912) was listed in the Gazettes referred to in the Sixth schedule. but does not include: c. any State forest, national forest, timber reserve or flora reserve, within the meaning of the Forestry Act 1916; or d. any national park, historic site, nature reserve or state game reserve,. within the meaning of the National Parks and Wildlife Act 1974.
* Protected Tree	Protected tree means a tree that is the subject of or within the area, as defined *in section 48 of the Electricity Supply Act 1995 (NSW)*; that is subject of an Interim Heritage Order, is listed on the State Heritage Register, is subject of an order in force under *section 136 of the Heritage Act 1977*; is subject of an *Interim Protection Order under the National Parks & Wildlife Service Act 1974*; is listed individually or as part of a place or area listed on a Local Government Authority's Local Environmental Plan or a Regional Environmental Plan made under the *Environmental Planning & Assessment Act 1979*; or a protection conferred by any similar law. It includes trees subject to a Local Government Authority Tree Protection Order (TPO). Size and age criteria differ between Local Government Authorities, and these should be checked in the first instance. It also means a tree within a protected area.
Pruning	All forms of pruning as defined by *AS4373-1996.*
Regrowth Allowance	The trimming of vegetation in addition to the minimum safety clearances detailed in Tables 1 and 2 dependant on environmental considerations and trimming cycles.

* Significant Tree	Significant tree means any tree classified by the National Trust of Australia (NSW) as significant, recognised by a Government Authority or by a recognised Community Group, or listed by a Local Government Authority on a Significant Tree Register (STR). Significant trees may be individually heritage listed, or form part of a larger place listed as a heritage item, area or heritage conservation area (for instance street trees within a conservation area). Significance is generally in relation to one or more of historic, aesthetic, scientific (e.g.: botanical, ecological or horticultural value) or social value. Heritage significance in NSW is defined in reference to the NSW State Heritage Register criteria, a copy of which is at Appendix A, along with other criteria.
Tree	Tree means a tree taller than 3 metres, or having a canopy of more than 3 metres in maximum diameter or having a trunk with a circumference at a height of 1 metre from the ground of more than 0.3metres. Trees can include shrubs and other plants for the purposes of the *Electricity Supply Act 1995 (NSW)*.
Urban Area	A built-up area as designated by street lighting, or subdivision into small allotments or other areas agreed to by the Network Operator and the local council.
Vegetation	All plant life including, but not limited to *trees,* palms, vines, shrubs, and grasses such as bamboo but excluding lawns.
Water Crossing Sign	A notice located adjacent to bodies of water, warning of the presence of overhead or underground electricity powerlines crossing the body of water.

1. OVERVIEW OF RELEVANT LEGISLATION

1.1 General

Land use controls in Australia are principally governed by the laws of individual States and Territories. Particular federal laws also apply in all areas of the Commonwealth. The *Environment Protection and Biodiversity Conservation Act 1999* ***(Biodiversity Act)***, replaced five federal environment statutes. Approval will be required to take any action that will have, or is likely to have, a significant impact on areas and attributes for which the Commonwealth is responsible. These 'triggers' include actions affecting World Heritage properties, Ramsar wetlands, listed threatened species, listed migratory species and Commonwealth marine areas. Obligations and penalties differ substantially between jurisdictions. Where the corporation conducts business or carries out activities in several States or Territories, the statutory requirements of each must be complied with.

This section of the guideline is arranged in four parts. ***Each provides a different means of accessing information about the environmental laws that affect network operators.***

Part A provides access to the environmental legislative requirements through an activity table. The table allows cross-referencing of major activities undertaken by network operators, such as line maintenance, with specific environmental aspects of those activities and the applicable legislation.

Part B provides a broad overview describing the basic environmental performance and reporting obligations imposed on network operators under NSW and Commonwealth law. It is structured to provide a synopsis of the major environmental laws that affect network operators' activities under the following subject headings:

- waste management;
- land contamination;
- air pollution;
- water pollution;
- noise pollution; and
- hazardous substances.

Part C details the relevant legislative provisions and their implications for the network operators. The part contains the following information:

- the Act name and section;
- a summary of the obligation or offence imposed;
- identification of the appropriate regulatory authority;
- the relevance of the provision to the corporation;
- identification of the parties who may be liable in the event of a breach;
- the maximum penalties which may be imposed for failure to comply with the provision; and
- any defences that may be available to the corporation in the event of a breach of the provision.

Part D provides access to the Occupational Health & Safety legislative requirements through an activity table. The table allows cross-referencing of major activities undertaken by network operators with specific occupational health and safety obligations and the applicable legislation.

1.2 Part A: Network Activities and Environmental Obligations – Reference Table

This table may not cover all activities pertaining to vegetation management, however it would include:

- ***Line maintenance trimming;***
- ***Access track maintenance;***
- ***Easement/corridor cleaning;***
- ***Re-growth control; and***
- ***Emergency maintenance.***

Specific Management Issues	**Environmental Aspects**	**Relevant Legislation or Regulations**
Line Maintenance – Specific Vegetation Management Issues		
Vegetation Management (trees)	Controlling overgrowth of trees and other vegetation	♦ *Electricity Supply Act 1995* ♦ *Electricity Supply (General) Regulation 2001 Part 11* ♦ *Native Vegetation Conservation Act 1997* ♦ *Heritage Act 1977* ♦ *Rural Fires Act 1997* ♦ *Rural Fires Regulation 1997* ♦ *Environmental Planning and Assessment Act 1979* ♦ *SEPPs 14, 19, 26,44,46,56, 58C and 71* ♦ *World Heritage Properties Conservation Act 1984* ♦ *Environment Protection & Conservation of Biodiversity Act 1999*
Vegetation Management (use of herbicides)	Risk of escape during transportation, due diligence required in applying herbicide (*e.g.*, Tordon TCH, Access)	♦ *Protection of the Environment Operations Act 1997* ♦ *Environmentally Hazardous Chemicals Act 1985* ♦ *Scheduled Chemical Wastes Chemical Control Order 1994* ♦ *Occupational Health and Safety Act 2000* ♦ Occupational Health and Safety Regulation, 2001 ♦ *Pesticides Act 1999* ♦ *Dangerous Goods Act 1975 and Regulation 1999*
Vegetation Management (noxious weeds)	Managing noxious weed growth in areas containing electricity powerlines	♦ *Noxious Weeds Act 1993* ♦ *Noxious Weeds Regulation 1993*

Specific Management Issues	Environmental Aspects	Relevant Legislation or Regulations
Vegetation Management (endangered species)	Effect of physical clearing methods and herbicide use on endangered species / critical habitat	♦ *National Parks and Wildlife Act 1974* ♦ *National Parks and Wildlife (Land Management) Regulation 1995* ♦ *Threatened Species Conservation Act 1995* ♦ *Native Vegetation Conservation Act 1997*
Vegetation Management (soil)	Soil erosion arising from clearing of vegetation	♦ *Soil Conservation Act 1938* ♦ *EP&A Act 1979* ♦ *Heritage Act 1977 (relics / archaeology provisions)*

1.3 Part B: Major Environmental Laws

The main pollution control statute in New South Wales is the *Protection of the Environment Operations Act 1997* ***(Operations Act)***, which commenced on 1 July 1999. This Act replaced the *Environmental Offences and Penalties Act 1989,* the *Pollution Control Act 1970* and other specific legislation such as the *Clean Air Act 1961.*

The *Operations Act* contains the following key elements:

- an integrated licensing system, under which a single licence can cover emissions in multiple media from a site or activity;
- administrative enforcement through environment protection notices (clean up, prevention, prohibition and compliance cost notices);
- environment protection offences graded into three tiers and covering offences of air, water, noise, and land pollution;
- a duty to report any pollution incident which threatens material harm to the environment where the corporation occupies relevant land or employs relevant persons;
- directors and managers are made personally liable for offences committed by the corporation;
- provision for voluntary and mandatory environmental audits of the corporation to be conducted; and
- authority for appropriate officers to perform a range of actions, such as questioning persons, requiring information or records and entering and searching premises.

The *Operations Act* is supplemented by other regulatory instruments that address issues of relevance to network operators as follows:

1.3.1 Waste Management

The Environment Protection Authority ***(EPA)*** regulates the handling, transportation and disposal of wastes under the *Operations Act.*

Under s48 of the *Operations Act*, a person who is the occupier of any premises at which a scheduled activity is carried on must hold a licence that authorises that activity to be carried on at those premises. One of these activities is the generation or storage of hazardous, industrial or Group A wastes.

A licence is required under s49 of the *Operations Act* for activities listed in Schedule 1 that are not premises based (such as mobile waste processing). This category includes the use of mobile plant to recycle oil in transformers.

An environment protection licence as a *waste facility* is *not* required if hazardous, industrial or Group A waste is treated, processed or reprocessed by a mobile plant which is licensed.

The reporting and storage obligations under the *Protection of the Environment (Waste) Regulation 1996* (***Waste Reg***) apply only to non-licensed landfill sites, non-licensed waste activities or non-licensed waste transporting.

A *non-licensed waste activity* means an activity, carried on for business or other commercial purposes, that involves the generating or storage of hazardous waste, industrial waste, Group A waste but which is not licensed under the *Operations Act*.

The Appendix to Schedule 1 of the *Operations Act* describes various types of waste as being industrial, hazardous, Group A *etc*.

Additional licences are required for the storage and disposal of certain scheduled chemicals and chemical wastes under the *Environmentally Hazardous Chemicals Act 1985* ***(EHC Act)***.

The primary responsibility of the network operator is to classify the waste properly (irrespective of whether it is going to be disposed of or reprocessed), to use a licensed transporter and to ensure that the wastes are taken to suitable mobile waste processors or waste facilities. Liquids that cannot be lawfully discharged directly to sewer may be subject to licensing under the *Operations Act*. Legislation dealing with discharges to sewer include the *Sydney Water Act 1994*, *Hunter Water Act 1991*, s68 of the *Local Government Act 1993* and clause 55 of the *Protection of the Environment (General) Regulation 1998* and the *Local Government (Water Services) Regulation 1999*.

Vegetation management by products are recycled wherever possible and only treated as waste only after all other options have been considered.

The *Waste Avoidance and Resource Recovery Act 2001* provides for the most efficient use of resources, including the recovery of organic matter for processing and reuse. Local Governments are required to develop strategies for dealing with the recovery of organic matter, including vegetative matter from the pruning or removal of street trees and trees/shrubs from public land and private property. Waste facility operators are similarly required to provide receival facilities for organic material that is free from non-organic contamination. Further information on the recycling and reuse of organic material can be found from the websites www.compostaustralia.com , www.recycledorganics.com and www.bioenergyaustralia.org or the relevant local government.

1.3.2 Land Contamination

The *Contaminated Land Management Act 1997* ***(CLM Act)*** is the principal statute governing the use, occupation and ownership of contaminated land in New South Wales. Whilst the *Operations Act* deals generally with prevention of land contamination by pollution, the *CLM Act* regulates contaminated land after the actual contamination has taken place.

It is a major offence under the *Operations Act* to wilfully or negligently dispose of waste in a manner which harms or is likely to harm the environment. There are also prohibitions against transporting waste to a place that cannot lawfully be used as a waste facility, or permitting land to be used as a waste facility when it cannot lawfully be used for that purpose.

The *CLM Act* is primarily directed at instances where the EPA believes it needs to intervene due to the significant risk of harm to human health or to the environment from contaminated land. The EPA can order the investigation and remediation of a site. It regulates the management of contaminated land using the *National Guidelines for the Assessment and Management of Contaminated Sites* developed by the Australian and New Zealand Environment Conservation Council and the National Health and Medical Research Council.

The *CLM Act* also imposes a duty to report upon landowners and other persons whose activities have contaminated land. Responsibility for the contaminated land always remains with those persons responsible for contamination. Where, however, the polluter cannot be located, or is insolvent, the owner of the land or the *notional owner* will become responsible for remediation. In general terms, the notional owner is a person (not being the owner of the land or the Crown or a body representing the Crown) who is entitled to a freehold interest in the land.

State Environmental Planning Policy No. 55 - Remediation of Land prevents changes to land usage until the relevant consent authority has considered whether the land is contaminated and whether remediation is necessary in order to accommodate the proposed use. Remediation work must be performed in accordance with EPA standards and *Planning Guidelines for Contaminated Land.*

1.3.3 Air Pollution

The *Operations Act* incorporates provisions dealing with the general minimisation of air pollution, pollution by fires and motor vehicle emissions. In relation to network operators, the most relevant provisions of the *Operations Act* are the duties to maintain and operate plant, and to deal with any materials, in a proper and efficient manner so as to avoid causing air pollution.

1.3.4 Hazardous Substances

The *EHC Act* contains provisions to control the effect of chemicals and chemical wastes on the environment. It provides for the declaration of chemical wastes and the creation of Chemical Control Orders ***(CCOs)*** and declared chemical wastes.

There are CCOs for dioxin-contaminated wastes, aluminium smelter wastes, polychlorinated biphenyls ***(PCBs)***, organotin wastes and scheduled chemical wastes. Most CCOs require licences to be held by people engaging in prescribed activities with respect to the environmentally hazardous chemical. Prescribed activities are manufacturing, processing, keeping, distributing, conveying, using, selling or disposing of the chemical waste, or any act related to those activities. The keeping and transportation of dangerous goods is regulated by the *Dangerous Goods Act 1975* ***(DG Act)***, which requires licences and authorisations for dealing with dangerous goods of various classes. The *Road and Rail Transport (Dangerous Goods) Act 1997* ***(RRT(DG) Act)*** prescribes separate licensing obligations for the transport of dangerous goods by road or rail.

Pesticides are regulated specifically under the *Pesticides Act 1999*, which sets out various offences relating to the misuse of pesticides. The Occupational Health and Safety Regulation, 2001 contains provisions relating to hazardous substances. Chapter 6 of the Regulation sets out specific risk control measures for hazards arising from the manufacture, supply and use of hazardous substances. The need for employers to carry out health surveillance on employees exposed to hazardous substances and the need for employers and medical practitioners to retain records is also covered in this Chapter.

1.3.5 Water Pollution

The *Operations Act* prohibits any person from causing or permitting water pollution except in accordance with the regulations or a licence held by the person. Water pollution is defined very broadly to include anything that produces a change in the physical, chemical or biological condition of any waters. It is sufficient for a conviction that the substance was placed in a position from which it was likely to end up in the receiving waters.

1.3.6 Noise Pollution

This environmental aspect is also regulated by the *Operations Act*. Occupiers of premises are required to maintain plant in an efficient condition, operate plant properly and efficiently and to deal with materials in a proper and efficient manner so as not to cause noise emissions from the premises.

1.4 Part C: Relevant Legislative Provisions

1.4.1 Environmental Planning and Assessment Act 1979

The *Environment Planning and Assessment Act 1979* ***(EPA Act)*** provides the primary source of obligations with respect to development activity in NSW. Part 4 of the EPA Act applies where a State Environmental Planning Policy ***(SEPP)***, Regional Environmental Plan ***(REP)*** or a Local Environmental Plan ***(LEP)*** requires a consent to be obtained before carrying out a development. *Development* is defined to include: the use of land; subdivision of land; erection of a building; carrying out of a work and the demolition of a building.

Where development consent is not required for a proposal (relevant to vegetation), the proposal may still need to be assessed under Part 5 of the *EPA Act* and specifically with a project under Part 3A of the EPA Act. The network operator, as the *determining authority*, will be required to consider the potential environmental impacts of any activity proposed to be carried out by it or on its behalf. The network operator must decide in accordance with the test laid down in s112 whether the proposal "is likely to significantly affect the environment". Furthermore, the network operator must not carry out an activity in respect of land that is a critical habitat, or is likely to significantly affect threatened species, populations or ecological communities, or their habitats, unless a species impact statement ***(SIS)*** has been prepared under the *Threatened Species Conservation Act 1995.*

Where the proposal is decided to be significant an Environmental Assessment is required under the provisions of Part 3A of the EPA Act.

Most NSW Councils now have or are moving towards making Local Environmental Plans (LEPs) made under the EP&A Act. In addition Planning NSW has made Regional Environmental Plans (REPs) and State Environmental Planning Policies (SEPPs) under this Act. (See **Part B,** earlier for more). Heritage listed trees, plantings and areas have usually been identified by a local heritage study, then leading to their listing as local heritage items or areas on the LEP. Local Councils are responsible for the protection and management of local heritage items in NSW, under amendments to the *Heritage Act 1977* and *EP&A Act 1979.*

In addition, many NSW Councils have conducted specific tree surveys leading to Tree Protection Orders, covering all trees over a set size in the Local Government Area, or Significant Tree Registers, or protected tree listings on their LEP. Trees or vegetation may be listed singly, in groups, as part of areas such as parks or reserves, or as street plantings in residential or village conservation areas.

Electricity distributors planning pruning operations must consult with Local Councils to identify any heritage listed, protected or significant trees in that Local Government Area, before finalising pruning plans. Appropriate prior community consultation and Council consents may be required before pruning occurs.

Under 1999 and 2002 amendments to the *Heritage Act 1977* delegations of Heritage Council powers were made to Local Government, giving Councils powers to defer development and move to assess or protect potential or actual heritage items which may include trees or vegetation of local significance. All non-metropolitan Councils have delegations to place Interim Heritage Orders preventing works or harm to potentially significant trees or vegetation.

In many cases the current LEP listings do not reflect the full extent of significant trees or vegetation and it is thus important to consult Councils for the most up to date information on LEP listings and proposed listings.

In addition Councils should be asked about any Tree Protection Order or Significant Tree Register in existence, and what that means for proposed tree or vegetation pruning operations in that area. Any necessary prior consents must be obtained before proceeding to undertake pruning. In some cases exemptions from normal consents may be negotiated to expedite pruning in appropriate circumstances.

1.4.2 Vegetation Clearance

There are various regulatory instruments that deal with land clearing activities. The core legislative obligations are contained in the *Native Vegetation Act 2003* ***(NV Act)***. Under this statute, the network operator may be required to obtain a development consent before clearing native vegetation. There is a specific exemption for public utilities and emergency work, but this only operates in respect of land which has yet to become subject to a property vegetation management plan. Where the exemption remains available, it applies to clearing that is to a minimum extent for the maintenance of public utilities (*e.g.*, the provision of power lines and the transmission of electricity) or where native vegetation may reasonably be thought likely to be at risk of causing personal injury or damage to property.

Certain types of land and clearing are excluded from the operation of the *NV Act*, including:

- land zoned as 'residential', 'village', 'township', 'industrial' or 'business';
- land subject to *State Environmental Planning Policy No. 14 - Coastal Wetlands* (***SEPP 14***);
- land subject to *State Environmental Planning Policy No. 26 - Littoral Rainforests* (***SEPP 26***);
- clearing authorised by the *Rural Fires Act 1997*;
- clearing authorised by the *Noxious Weeds Act 1993*.

SEPP 14 restricts land clearing without consent on certain land designated as coastal wetland. Such development requires concurrence from the Director General of Department of Planning (NSW).

SEPP 19 Bushland in Urban Areas permits disturbance of urban bushland to occur without consent provided it is for the purpose of bushfire hazard reduction; or constructing, operating or maintaining lines for electricity or telecommunication purposes.

SEPP 26 also creates a more rigorous consent procedure where the subject land is designated as littoral rainforest. The Minister administering the *EP&A Act* must concur in granting consent and is required to consider any representation made by the Department of Planning as well as public interest factors.

Unless a licence has been obtained under the *National Parks and Wildlife Act 1974* ***(NPW Act)*** or the *Threatened Species Conservation Act 1995* ***(TSC Act)*** it is an offence under the *NPW Act* to harm any threatened species, population or ecological community. Additionally, the network operator must not, by act or omission, damage any critical habitat. There is also an offence under the *NPW Act* of harming protected fauna.

It is a defence in each of these provisions if the act or omission was essential for the carrying out of development under an *EPA Act* Part 4 development consent or an activity complying with *EPA Act* Part 5. There is provision in the *NPW Act* for the Minister administering the Act to grant an easement or right of way in relation to electricity transmission lines. The Department of Environment and Conservation (NPW Division) maintain two databases which should be consulted on threatened species, the NSW Atlas of NSW wildlife, and the Rare or Threatened Atlas of Plants.

In contrast to the above regulatory instruments, the *Noxious Weeds Act 1993* ***(NW Act)*** imposes a positive duty on the network operator to control noxious weeds on land occupied by it, to the extent necessary to prevent the weeds spreading to any adjoining land.

Other State Environment Planning Policies to consider in managing vegetation are:

- 44 Koala Habitat Protection;
- 56 Sydney Harbour Foreshores and Tributaries;
- 58C Protecting Sydney's Water Supply; and
- 71 Coastal Development.

1.4.3 The Threatened Species Conservation Act 1995

It is the Electricity Distributors responsibility to ensure activities are assessed to determine whether there is an impact on threatened species. This is particularly relevant for proposed developments or activities.

The Department of Environment and Conservation maintains two databases for threatened species:

- Atlas of NSW Wildlife
- ROTAP database

1.4.4 Electricity Supply Act 1995

Section 48 of this Act refers to "Interference with electricity works by trees". This section sets out a Network operator's rights and obligations to require the owner of a premises to trim or remove a tree on those premises which could interfere with that Network operator's electricity works.

Under emergency or failing action of the owner of the premises, the Network operator may carry out the tree trimming work itself.

Other than for trees on easements, or trees planted in a way, which would interfere with electricity works, the Network operator must meet reasonable costs. This is specified where notices have been served on owners of premises to remove or trim trees. Network operators can also carry out the work and recover the costs from owners of premises. Costs incurred by Network operators are recoverable through court jurisdictions. The requirement for the work to be carried out safely by qualified persons always applies.

1.4.5 National Electricity Network Safety Code

The National Codes NENS 01 and 04 in conjunction with the NSW Code of Practice for Electricity Transmission and Distribution Asset Management and HB C(b) 1-2003 'Guidelines for Design and Maintenance of Overhead Distribution and Transmission lines" provide information on safety clearances from overhead power lines. These guidelines state that trees should be kept away from overhead to achieve the following:

- Ensure public safety;
- Minimise the risk of fire caused by the contact between trees and overhead lines;

- Reduce the number of interruptions to supply caused by trees and
- Protect the distributor's assets from damage.

When determining the amount of clearance between trees and power lines consideration should be given to the following:

- Type of line ---- whether it is bare, covered or insulated overhead conductors;
- Conductor sag and swing;
- Tree movement, soundness and regrowth; and
- Overhang of branches.

1.4.6 Electricity Supply (Safety and Network Management) Regulation 2002

This regulation has been enacted to ensure Network Operators under the Electricity Supply Act develop and implement various plans in respect to the operation of adequate, safe and reliable transmission and distribution systems.

The regulation requires the following four (4) plans be lodged with the Director General and implemented by the Network Operator:

1 A network management plan, for the purpose of ensuring that transmission or distribution systems provide an adequate, reliable and safe supply of electricity of appropriate quality.

2 A customer installation safety plan, for the purpose of ensuring the provision of safe electrical installations and connections.

3 A public electrical safety awareness plan, for the purpose of providing a warning to the public of the hazards associated with electricity networks.

4 A bush fire risk management plan, for the purposes of ensuring public safety and for other related purposes (fire risk).

Clause 18 of the Regulation requires that "a person must not carry out work on or near a network operator's transmission or distribution system and a network operator must not allow a person to carry out work on or near its transmission or distribution system unless:

(a) The person is qualified, under the relevant requirements of the network operator's network management plan to carry out the work, and
(b) The work is carried out in accordance with the relevant requirements of that plan.

Generally, the network management plans require that persons are:

Trained – in accordance with Industry Guideline EA18 "Guide to the Training of Personnel Working on or near Electricity Works (October 1999).

Qualified – hold appropriate formal qualifications issued by a Registered Training Organisation (RTO) under the National Training framework.

Authorised - have been formally authorised in writing by the relevant network operator to work on or near its network, and received instruction in any local rules, procedures, precautions, hazards etc. Persons who work across various networks (e.g. Accredited Service Providers) will need to be authorised by each network operator.

Competent – employers have an obligation to ensure employees retain their skills in order to carry out their duties. This may include persons demonstrating their ability to carry out such tasks as Pole Top or EWP Rescue, Control Descent Device, Expired Air Resuscitation, Confined Spaces Rescue etc.

1.4.7 The Electricity Supply (General) Regulation 2001, Part 11

This regulation enables an Electricity distributor to develop a tree management plan in consultation with the relevant local authority and the community at large.

The regulation is seen as a way to ensure the management and protection of trees in accordance with the expectations of the community.

The relevant sections of this regulation are reproduced below:

Clause 102 Preservation of trees

1) A service provider must not remove any tree, or trim any tree in a way that substantially damages the tree, unless:

   a) It is of the opinion that it is necessary to do so to protect its powerlines or the safety of persons or property under or near its powerlines; and
   b) It has considered alternative methods and is of the opinion that none of those methods are feasible in the circumstances (including economically feasible); and
   c) The service provider is acting in accordance with a tree management plan.

2) Alternative methods include, but are not limited to, the use of aerial bundled cables, the controlled trimming of trees and the appropriate location or relocation of powerlines (including placing them underground).

Clause 103 Tree management plans

1) A service provider may establish a tree management plan for the trimming, or for the staged removal and replacement, of those species of trees that have a propensity to interfere with powerlines.

2) A tree management plan may contain (but need not be limited to) the following matters:
   a) Lists of suitable species of trees for planting under or near powerlines in different localities or situations;
   b) Plans for trimming or removing and replacing existing trees and for controlling future planting of suitable species of trees;
   c) Trimming or removing trees in; an emergency;
   d) Methods for trimming trees;
   e) The use of accredited contractors for trimming trees;
   f) The intended allocation of costs between the service provider and the relevant council or councils for the district in which the plan is to operate;
   g) The environmental factors to be considered in trimming trees; and
   h) The development of public education and publicity programs encouraging the selection of appropriate species of trees for planting under or near powerlines.

3) A tree management plan may make different provision with respect to public land, private land, urban land and rural land.

4) A tree management plan may be amended by a subsequent tree management plan.

Clause 104 Consultation with Councils and the public

A tree management plan is to be prepared in a way that gives an opportunity to comment on the proposed plan to the relevant council or councils for the district in which it is to operate, to the residents of the district and to local community groups.

1.4.8 Other Bodies Responsibilities and Requirements

In accordance with the provisions of the many pieces of legislation it is necessary to comply with the requirements of other bodies.

- **Rural Fires Service Act 1997**

Electricity distributors are represented on bush fire management committees, which have been established in local government areas outside Sydney and Newcastle. These committees are charged with preparing bush fire management plans that contain procedures for controlling fires and for managing fuel levels.
The committees are well placed to provide advice and the plans they prepare can provide statutory support for fuel management.

- **National Parks and Wildlife Act 1974**

Electricity distributors are required to comply with the provisions of the act particularly in regard to management issues of vegetation in land located in or administered by the Department of Environment and Conservation (DEC).

Particular attention needs to be given to Historic sites and items of European and Aboriginal archaeology.

A document called "Procedures for power line maintenance in lands administered by the National Parks and Wildlife Service of NSW' produced by the former 'Electricity Association of NSW' sets out the agreed practices between the parties in regard to the inspection and maintenance of powerlines.

The DEC (NPW) can be contacted on www.npws.nsw.gov.au

- **National Trust of Australia Act 1990 and Local Historical Societies**

To ascertain the location of important or significant trees, electricity distributors should also consult local or district historical societies, the National Trust of Australia (NSW) and local councils. The Trust will assist in the recognition and provision of advice on the handling of significant trees in any area and to give briefing and written material to any electricity distributor.

The National Trust can be contacted on www.nsw.nationaltrust.org.au

- **Sydney Water Catchment Management Act 1998**

Attention needs to be paid to areas that are deemed for the preservation of water supply in the special catchment areas.

Electricity distributors are required to make arrangements with Sydney Catchment Management Authority in regard to maintenance of powerlines and vegetation in the Special areas.

- **Trees and Plant Communities of Special Value**

Trees and plant communities of special value may be identified under any of the above statutes or instruments.

Special attention should be paid to botanically, ecologically or scientifically significant vegetation important or historically significant stands of trees, stands of special aesthetic significance, or rare and threatened plant species or ecological communities. Every endeavour should be made to ascertain where such important or significant trees are located.

In the first instance, electricity distributors should contact Local Council tree protection or heritage officers, the NSW National Trust, the State Heritage Inventory www.heritage.nsw.gov.au) and the DEC for information on rare or endangered, significant, protected or heritage listed trees or vegetation areas.

See definitions at the beginning of the document for definitions and more information regarding the terms tree, significant tree, protected tree, heritage listed tree and protected area.

Several options may be exercised when trimming or pruning is required of trees of special value and agreement may be reached in reducing the regrowth allowance. The options could include the replacement of trees or the relocation of the power lines albeit these options are more suitable for inclusion in a tree management plan.

- **The Heritage Act 1977**

The *Heritage Act 1977* provides that where a place is subject to an interim heritage order issued by the Heritage Council or is listed on the State Heritage Register, it is an offence to damage the place, carry out any development on the land or damage or destroy any vegetation on the land without the prior approval of the Heritage Council.

Such places can include private gardens, public parks or reserves, residential streetscapes or districts, stock routes and colonial roads lined with trees or vegetation, natural areas such as forests, wetlands and human modified landscapes such as farming land with scattered woodland cover.

The list of places on the State Heritage Register can be accessed on www.heritage.nsw.gov.au by searching by Local Government Area or address or place name. In addition the State Heritage Inventory, listing all heritage items with statutory protection (e.g.: LEP heritage items, Interim Heritage Orders or listed on the State Heritage Register) in NSW. Further information is available on the same website, or by contacting the NSW Heritage Office on telephone 02 9873 8500.

The Minister responsible for Heritage has the power to make Interim Heritage Orders and stop work orders to protect places under threat, or defer development to allow assessment and appropriate protection of places with recognised or potential heritage values.

Unless specific exemptions from normal approval have been granted by the Minister responsible for the *Heritage Act 1977* over such areas for activities such as tree pruning, electricity distributors require specific prior approval from the Heritage Council of NSW under section 60 of the Act. Section 60 forms can be downloaded off the NSW Heritage Office website on www.heritage.nsw.gov.au. Specific approval exemptions to allow appropriate regular pruning in specific places or circumstances can be negotiated and agreed with the Heritage Office. The Heritage Act also requires prior Heritage Council approval of excavation permits when excavating in areas of known or potential archaeological resources.

- **State Emergency and Rescue Management Act 1989**

The SERM Act requires local government authorities to prepare Local Disaster Plans based on emergency risk management assessments conducted in accordance with AS/NZS 4360:2004. These assessments include the response measures required and agencies responsible for mitigating foreseeable risks caused by either natural or technological causes or events. Emergency means an emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action), requiring a coordinated emergency response.

The emergency risk assessments and Local Disaster Plans are developed in consultation with local communities and stakeholders and are required to be agreed to by the Local Council and successively the District and State Emergency Management Committees, on which Network Service Providers are represented.

These assessments may warrant the removal of vegetation near power lines that poses an identifiable risk to the power supply infrastructure, for example due to a severe weather event, earthquake or related infrastructure failure.

- **Other Legislation**

Listed below are some of the major environmental or land management legislation Electricity distributors should have an understanding of:

- Rivers and Foreshores Improvement Act 1948
- Crown Land Act 1989
- Noxious Weeds Act 1993
- Fisheries Management Act 1994

1.5 Part D: Occupational Health and Safety Obligations

Activities of the Network Operators	Relevant Legislation, Regulations or Codes of Practice
General Occupational Health and Safety obligations	• Occupational Health and Safety Act 2000
Specific Occupational Health and Safety obligations	• Occupational Health and Safety Regulation 2001
Risk Management obligations, training, supervision, personal protective equipment, first aid facilities, amenities and emergency provisions	• Chapter 2 OHS Regulation • WorkCover Code of Practice – Risk Assessment
Workplace consultation	• Chapter 3 OHS Regulation • WorkCover Code of Practice - Consultation
Work premises and working environments	• Chapter 4 OHS Regulation, Note: This chapter deals with a number of activities relevant to network operators for tree management, fall prevention, electricity, heat &cold, noise and manual handling • WorkCover Code of Practice – Technical Guidance
Plant (Machinery, tools and equipment)	• Chapter 5 OHS Regulation • WorkCover Code of Practice – Risk Assessment • WorkCover Code of Practice – Technical Guidance
Hazardous substances, MSDS, labelling, health surveillance	• Chapter 6 OHS Regulation • WorkCover Codes of Practice – Hazardous Substances (3 Codes)
Hazardous processes	• Chapter 7 OHS Regulation • WorkCover Codes of Practice – Technical Guidance • WorkCover Code of Practice – Low voltage electrical work
Construction work	• Chapter 8 OHS Regulation • WorkCover Code of Practice – Technical Guidance
Certification of workers	• Chapter 9 OHS Regulation
Accident Notifications	• Chapter 12 OHS Regulation

Note 1: The above information must not be used as a substitute for the OHS Regulation or OHS Act. Employers should consult the full Act and Regulation to determine their OHS obligations and responsibilities.

Note 2: At the time of publication of this Guideline, WorkCover was developing the "Code of Practice-Work near Overhead Power Lines", which will replace the ISSC 26 "Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines". The new Code is expected to be gazetted in 2006.

2. SAFETY AND CLEARANCES BETWEEN VEGETATION AND POWERLINES

2.1 General

The clearing and pruning of vegetation should be carried out in a manner as to ensure the health and safety of all persons. Injuries (including electrical injuries) can be avoided if potential hazards are identified before work commences on a property or site. Before commencing work follow three basic steps,

- Identify all hazards;
- Assess the risks of the work; and
- Control any problems so it is safe to commence work.

Clause 64 of the Occupational Health and Safety Regulation 2001 requires that persons, their plant and tools must not come into close proximity with overhead power lines (except if the work is done in accordance with a written risk assessment and safe system of work and the requirements of the relevant network operator).

In addition to the above requirements all persons involved in tree trimming operations shall be appropriately supervised, trained, qualified, authorized and competent in the work to be performed.

In addition to the clearances to conductors discussed below, consideration must also be given to creating safe access to other electricity assets and within the power line corridors.

2.2 Tree Clearances for Conductors

The clearances stated in Table 1 "Minimum Safety Clearance Radius for Bare and Covered" and Table 2 "Minimum Safety Clearance Radius for ABC and Covered Conductors (Insulated)" are the clearances that should be achieved where possible. Negotiations with local Councils may be required where existing agreements are in place and the agreed clearances differ from those shown in the tables mentioned above.

2.3 Vegetation Management for Crane and Plant Operations (also refer to Industry Guide ISSC 26)

As required by the "Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines" (ISSC26) the operator of the crane and the safety observer must have; and have documentary evidence of:

a) Following completion or recognition of the "Crane and Plant Electrical Safety Course", successfully undertaken a competency assessment in the "Crane and Plant Electrical Safety Course" at an interval no greater than twelve months from the previous assessment This is necessary to operate cranes and plant in the vicinity of live overhead power lines.

b) An Elevating Work Platform operator's **Certificate of Competency** issued under the Occupational Health and Safety Regulation 2001, or be a trainee undertaking on-the-job training under the direct supervision of a qualified operator.

c) Within the previous twelve months, demonstrated their ability to apply rescue procedure in the event of an accident associated with electrical apparatus and their ability to apply resuscitation procedure.

d) Having undertaken annual training in Network Operator's Safety Rules as required by the Electricity Supply (Safety and Network Management Plans) Regulation 2002;

e) Worksite Risk and Hazard Assessment.

f) Any Elevating Work Platforms and all tools must be insulated and tested every six months to the necessary voltage requirements in accordance with Industry Guideline EC14 "Guide to Electrical Workers Safety Equipment".

Note: At the time of publication of this Guideline, WorkCover was developing the "Code of Practice-Work near Overhead Power Lines", which will replace the ISSC 26 "Interim Guide for Operating Cranes and Plant in Proximity to Overhead Power Lines". The new Code is expected to be gazetted in 2006.

2.4 Additional Safety Requirements

a) All persons must be authorised by the Network Operator, including where appropriate, authorisation to accept Access Permits for trimming in the vicinity of high voltage conductors.

b) All safety clearances must be maintained in accordance with the Network Operator's and Industry requirements.

c) Tree trimmers will have completed as a minimum qualification "Tree Care for Electricity Workers" or its equivalent. Other courses may be developed and National Competencies may be set.

d) Where trees are being climbed, tree trimmers will be appropriately trained.

e) Where trees are being trimmed around live conductors, tree trimmers will be appropriately trained, qualified, authorised and competent.

f) Where traffic control measures are required, personnel will be appropriately trained to Roads and Traffic Authority requirements.

g) Where persons are using chain saws and other powered equipment, they shall be trained in their safe use.

h) All Personal protection equipment eg clothing, gloves etc will meet the requirements of "*Guide to Electrical Workers Safety Equipment*" (EC14) and the Network Operator's requirements.

2.5 Occupational Health and Safety Act (2000) and Regulations (2001)

In addition to the requirements outlined in Sections 1.5, 2.3 and 2.4 above, all general workplace safety measures required under the Occupational Health and Safety Act, 2000 and the Occupational Health and Safety Regulation, 2001 shall be complied with. These typically include the risk management provisions relating to hazard identification, risk assessment and risk control.

An employer must also consult with their employees to enable the employees to contribute to the making of decisions affecting their health, safety and welfare at work. Other provisions relating to plant safety, workplace amenities, first aid kits, accident notification, etc are also covered by the OHS Act and the OHS Regulation.

3. VEGETATION MANAGEMENT

3.1 General

Network operators have statutory obligations to maintain electrical assets in a safe and operable condition. However providers have in the past come under some criticism in their lack of flexibility in line clearing practices.

It is understood that there are particular difficulties in maintaining vegetation clear of powerlines in both densely populated, rural areas and in National Parks and open space reserves. Network operators are always considering ways to improve their environmental management practices.

Network Operators are aware that the electricity network is not the only use required of road reserves, parks and natural areas, however ensuring the safety of the public is of paramount importance in addition to maintaining a reliable electricity supply, however community expectations and aesthetic and environmental imperatives have a significant claim for consideration in this process.

It is important that all stakeholders consider open space values (tourism, recreation and amenity), the role of the land in terms of broader ecological sustainability as well as heritage considerations in maintaining and planting vegetation near powerlines.

Since 1977 there has been a marked growth in community concern and thus a rise in statutory heritage listings on LEPs and the State Heritage Register, Tree Protection Orders covering Local Government Areas and Significant Tree Registers. This parallels lobbying for and gazettal of increased areas of National Parks and other forms of nature protection reserves.

These listings have been for individual trees, groups of trees, avenues and street plantings, parks, reserves and natural areas. This reflects the increasing value the community is placing on remnants of the natural world and the cultural significance it places on human modified landscapes and plantings, of both native and exotic species.

The community is increasingly valuing the role and benefits of trees and vegetation in increasingly crowded and dense cities, sprawling suburbs and industrial lands, and their value in providing open space, recreation, tourism escapes, clean air and water.

Consideration would include but not be limited to, tree species present and their cultural requirements, tree age, local and regional ecological values and recognised and potential heritage values. They would also include consultation with Local Councils and relevant agencies to determine any significant, protected or heritage listed vegetation, necessary consents required. To effect appropriate management strategies, vegetation managers must be aware of planning instruments and policies at a local, regional and state and national level. These policies should be considered and acknowledged in the development of vegetation maintenance and tree planting programs or approvals. Such programs must contain a mechanism to monitor and review performance and hold service delivery accountable with regard to effective outcomes in these areas.

An important consideration for the implementation of a network management strategy is the issue of sustainability. Pruning that considers only line clearance without considering the broader, long term impacts on vegetation management has a very real potential for creating long term hazards in large numbers of street trees.

Trimming of vegetation at growth points and branch collars is to be conducted in accordance with the principles of Australian Standard AS 4373-1996.

Practical application will be given to the appearance of trees beneath overhead electricity lines having regard to the consideration that trees are often capable of maintaining heights greater than the lines themselves or the clearance envelope in Drawing 1 and Table 1.

Likewise inappropriate vegetation clearance can lead to altered species representation, local extinctions and detrimental physical effects such as weed invasion and soil erosion. All of these are legacies for other land managers.

Proper planning is essential in areas adjacent to powerlines. The planting of vegetation in the areas adjacent to powerlines must be carefully considered as large or fast growing species can lead to Network operators, Local Councils and other land managers committing additional resources in the future to ensure effective management.

In addition the areas within and surrounding electrical substations and equipment may require additional clearing / vegetation removal to create and or maintain Asset Protection Zones (refer RFS bushfire guidelines) in addition to the requirements for safety and security.

Water crossing signs require specific vegetation management attention in order to ensure visibility by approaching vessel in accordance with the Waterways Authority requirements.

3.2 Recognition of Land Types

There are essentially two locations that contain power lines. One is on public road reserve verges, the other location is on private properties.

For the purposes of this guideline these locations can be further categorised into the following;

- Urban
- Non-Urban
- Within Electricity Easements

In determining the most appropriate method of managing vegetation in a given location it is vital to be aware of the category of land type in which the vegetation exists. Different land use types may require different management strategies to successfully manage its vegetation, and delivering outcomes acceptable to the community. For example: a tree on an urban road reserve with no access difficulties may be managed differently to a tree on an urban property where access is very difficult. Management of vegetation within electricity easements is expanded in ISSC 20 "Guidelines for the Management of Electricity Easements".

3.3 Community Consultation

As outlined in the Scope of this guideline, the requirements for the establishment of new overhead power lines are addressed in industry guide *"Guidelines for the Development of Electricity Systems Community and Environmental Considerations"* (ISSC22). That guideline details the need for community consultation for the establishment of new power lines, particularly at the higher voltages. Larger projects may require a Review of Environmental Factors (REF) or an Environmental Impact Statement (EIS) that could involve formal engagement of community groups, publication of DRAFT documents for public comment, public advertisements and even open public forums and meetings.

In this guideline we are concerned with the maintenance of vegetation near the existing, built infrastructure. Consequently, community consultation in that context may generally involve:-

- Notification to customers, either generally (by way of public advertisement) or individually by card, letter or power bill, that vegetation work is about to commence in their area or street;
- Notification to an individual customer regarding a tree on their property that requires trimming;

- Notification to individual customers that a planned interruption to supply is required to carry out vegetation management work (usually 48 hours notice is given);
- Liaison with the local council that vegetation management work is about to commence in an area, particularly where a mutual obligation arrangement exists for the local council to chip or dispose of the trimmed material; and
- Liaison with the local council, community groups and other stakeholders when a new Vegetation Management Plan (see section 1.4.8), Vegetation Management Agreement (see section 3.6), or other local initiative is being negotiated between the local council and the local electricity distributor. This may involve invited public input, comment or meetings.

3.4 Factors Influencing Vegetation Management Options

Many factors will have an influence on the vegetation management option selected for any particular location. Land type is one influence and others may be:

- **Voltage of the Existing Power Lines**

Relevant when determining feasibility and costs associated with insulating the electrical network. Public risk or network reliability priorities may influence the proposed tree trimming works.

- **Tree Species**

Certain species are more likely to have a more aesthetic appearance after pruning. For example *Lophostemon confertus* (Brush Box) because of it's broad domed natural canopy. This is contrasted by other species such as Eucalyptus sp. which in general have a straight or erect type branching habit and therefore do not prune well.

- **Tree Health**

The tree's health should be one of the factors considered in the overall environmental assessment of the tree/s in determining the preferred vegetation management option.

- **Number of Trees**

May be a factor if removal and replacement is being considered. A street with many trees may provide a significant amenity and removal would have a significant impact on the area. This may be the situation even if the trees are in poor health. However, if a lone tree in poor health or a lone tree with an unsuitable branching habit (see above in Tree Species subheading), then consideration would be given to the removal and replacement of that tree.

- **Trimming Costs/Constraints**

A factor in considering possible environmental enhancement and removal/replacement.

- **Removal and Replacement / Tree Management Plan, Costs**

The costs should be carefully considered when assessing this vegetation management option, in comparison to retaining the trees and continuing to trim.

- **Good Corporate Citizenship**

An important factor when considering the ramifications of all options and processes of vegetation management.

- **Environmental Enhancement Program**

A selective program of environmental enhancement of the network (e.g. Use of insulated cables, undergrounding etc.).

- **Network Reliability**

Overall, one of the three key performance indicators for vegetation management. Consequently a strongly weighted factor to be considered when selecting the vegetation management option, particularly for voltages at or above 11kV.

- **Access**

Access to trees in certain locations such as urban backyards can prove very difficult. This combined with other influencing factors such as network reliability and safety will play a major part in selecting the correct management option.

- **Technical Feasibility**

Various technical options do exist such as the use of Aerial Bundled Cable (ABC), however not all situations make these options feasible. Correct assessment of the feasibility is essential, as other factors will influence this option, particularly costs.

Consideration of the various influencing factors (not all factors will be relevant in every situation) will assist in determining the most appropriate and realistic vegetation management option. It is important that this determination be justified against Section 2.1, and although the required factors for consideration in this section are not weighted, they nonetheless should be responsibly assessed to demonstrate the outcome determined.

3.5 Vegetation Management Options

Having considered the factors influencing a given situation, determination should then be given as to the most suitable vegetation management option to be taken. These options may include one or more of the following:

- **Trimming**

To be carried out in accordance with the practices outlined in this guideline and to maintain safety clearances.

- **Removal/Replacement**

To be carried out only after environmental assessment, consultation and a formal Tree Management Plan. Refer to the *Electricity Supply (General) Regulation 2001 Part 11* contained within the *Electricity Supply Act 1995*.

- **Slashing**

A limited option for distribution voltages and suitable for specific locations only. Commonly used for transmission line easements and acceptable within National Parks. Formal assessment will be required.

- **Climbing and Trimming**

This limited option works particularly well when managing large trees in situations where EPV access is not possible, or severely restricted. This option may also be useful in certain situations where live line trimming is not viable. It is also a cost-effective option where only a small number of trees need to be trimmed and in environmentally sensitive lands.

- **Close Approach Trimming near Live High Voltage Mains and Equipment**

Cost effective option, maintains supply and therefore helps reliability factor. Consequently a very good option where continuous supply is essential (e.g. near hospitals, commercial centres etc.).

- **Environmental Enhancement Works**

A program specifically set up to improve the aesthetic impact of the overhead power lines on the environment. Such a program is aimed to maximize the benefits to the general community, while demonstrating good corporate citizenship.

- **Undergrounding Overhead Power Lines**

A desirable solution but often financially unrealistic on a large scale. Selected locations may be cost effective after assessing all environmental factors.

- **Insulate Overhead Power Lines**

Aerial Bundled Cable (ABC), LV & HV - A good solution where large trees are retained below power lines. Allows a tree's canopy to develop under, around or over power lines, although the safety clearances must be maintained – refer Drawing 2 and Table 2.

Covered Conductor Thick (CCT), 11kV & 22kV - Similar to ABC and may reduce the trimming required. This Cable is designed for large trees growing adjacent to the power lines rather than directly under.

- **Re-Route Overhead Power Lines**

Could be considered after assessing all the environmental factors. Limited application as this option may create a new problem and effects along the alternate route.

- **Offset Crossarm Construction**

An option where room permits on roadside verge and where trees are planted offset from the power lines (may be combined with use of insulated cabling). May be particularly suited to column shaped trees such as pines, or palm trees.

- **Use of Taller Poles**

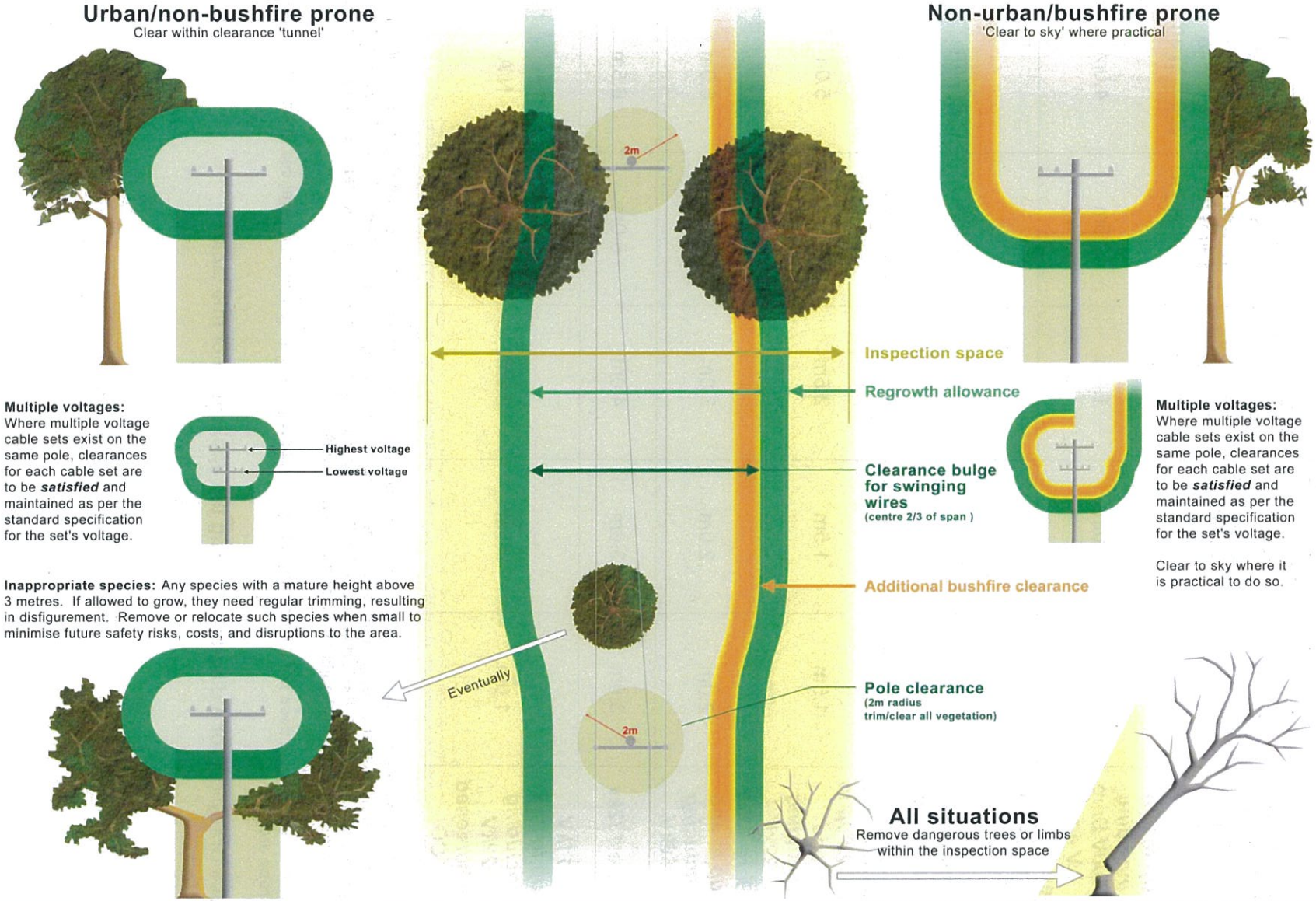
An option where tree health is good, trees will canopy below the wires, and tree numbers in a span are significant. However, insulation of the network may be the superior option.

3.6 Vegetation Management Agreements

Vegetation Management Agreements are another option to be considered which would put in place the protocol for managing vegetation in each of the local councils in the Network Operators' area. The key objectives would be negotiated between the two parties and may include such initiatives as tree removal arrangements, use of insulated cables or undergrounding where appropriate, preferred species selections for the streetscapes to achieve thematic, heritage or aesthetic outcomes, etc.

4. DRAWINGS and TABLES

4.1 Drawing 1: "Clearances for Bare Conductors and Covered Conductors"



4.2 Table 1: Minimum Safety Clearance Radius for Bare and Covered Conductors (CC)

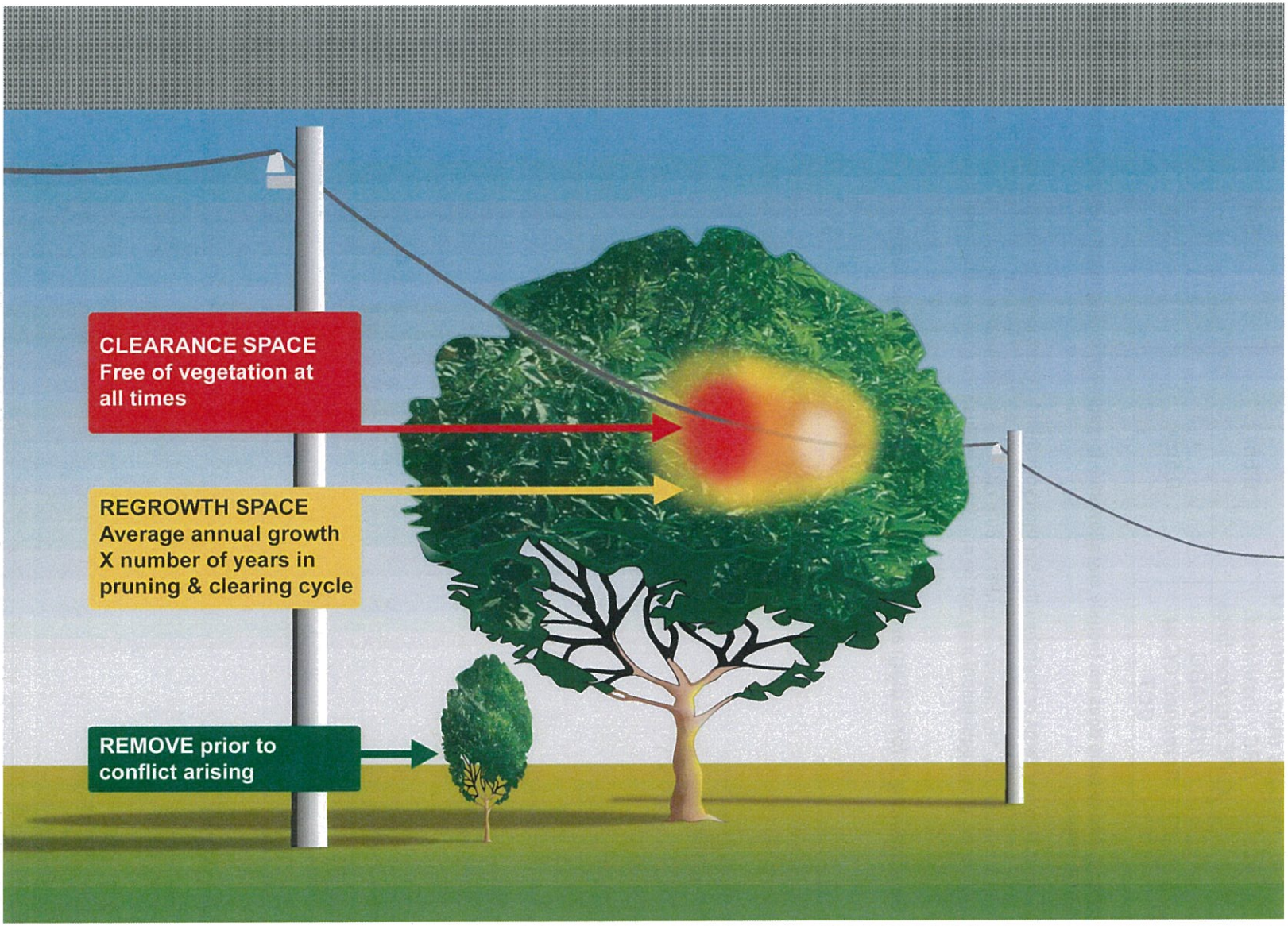
Cable Type & Operating Voltage	Distance along span				
	At Pole and 1/6th either side	Middle 2/3 of span less than 50m span	Middle 2/3 of span between 50m to 100m span	Middle 2/3 of span between 100m to 200m span	Middle 2/3 of span between 200m to 300m span[1]
Up to and including 1000V Bare LV and service lines	1.0m	1.0m	1.0m	2.5m	4.0m
Up to and including 1000V Covered LV and service lines	0.6m	0.6m	1.0m	2.5m	4.0m
Bare above 1000V up to and including 22kV	1.5m	1.5m	2.5m	3.5m	5.0m
Bare 33kV up to and including 66kV	2.0m	2.0m	3.0m	4.0m	6.0m
Bare 132kv	3.0m	3.0m	4.0m	5.0m	6.5m
11kV up to and including 22kV Unscreened CC	1.0m	1.5m	2.0m	2.5m	N/A

Note 1: For spans greater than 300m and clearances for voltages above 132kV to 500kV refer to specific construction types and design criteria or other specific requirements of the Network Service Provider. Also in specific circumstances the Network Service Provider may increase these minimum clearances due to other network constraints, e.g. High reliability requirements for Hospitals etc.

Note 2: Above table does not include any allowance for regrowth or additional clearances in Non-Urban/Bushfire prone areas.

See Drawing 1 for a diagram showing the application of this table.

4.3 Drawing 2: "Clearances for Aerial Bundled Cable and Covered (Insulated) Conductors"



4.4 Table 2: Minimum Safety Clearance radius for ABC and Covered Conductors (Insulated)

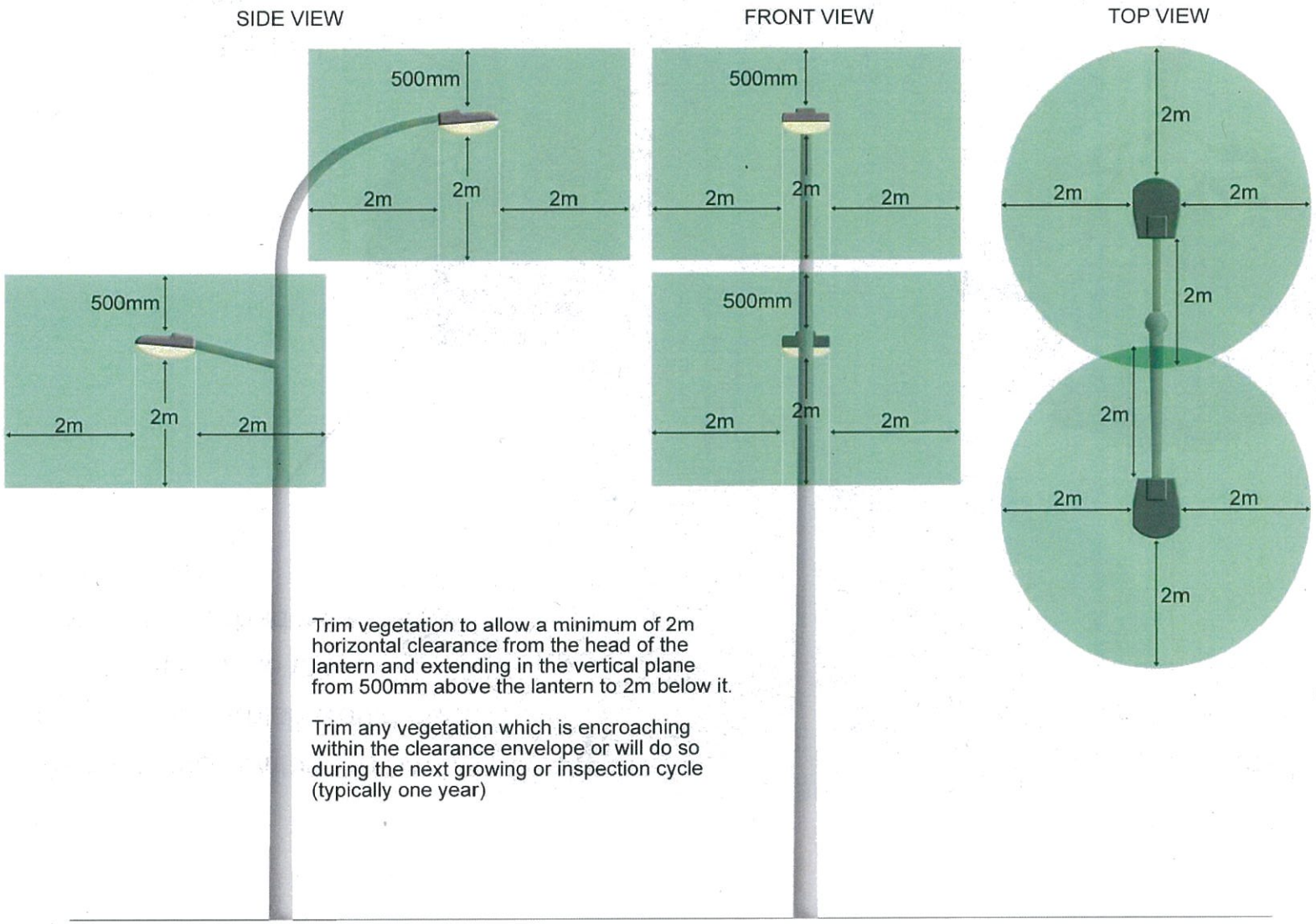
Cable Type & Operating Voltage	Distance along span		
	At Pole and 1/6th either side	Middle 2/3 of span less than 100m span	Middle 2/3 of span Greater than 100m
Less than 1000V LV ABC / Insulated XLPE Service lines	0.5m	0.5m	1.0m
11kV ABC / Screened CC or CCT	0.5m	0.5m	1.0m

Note 1: Above table does not include any allowance for regrowth or additional clearances in Non-Urban/Bushfire prone areas.

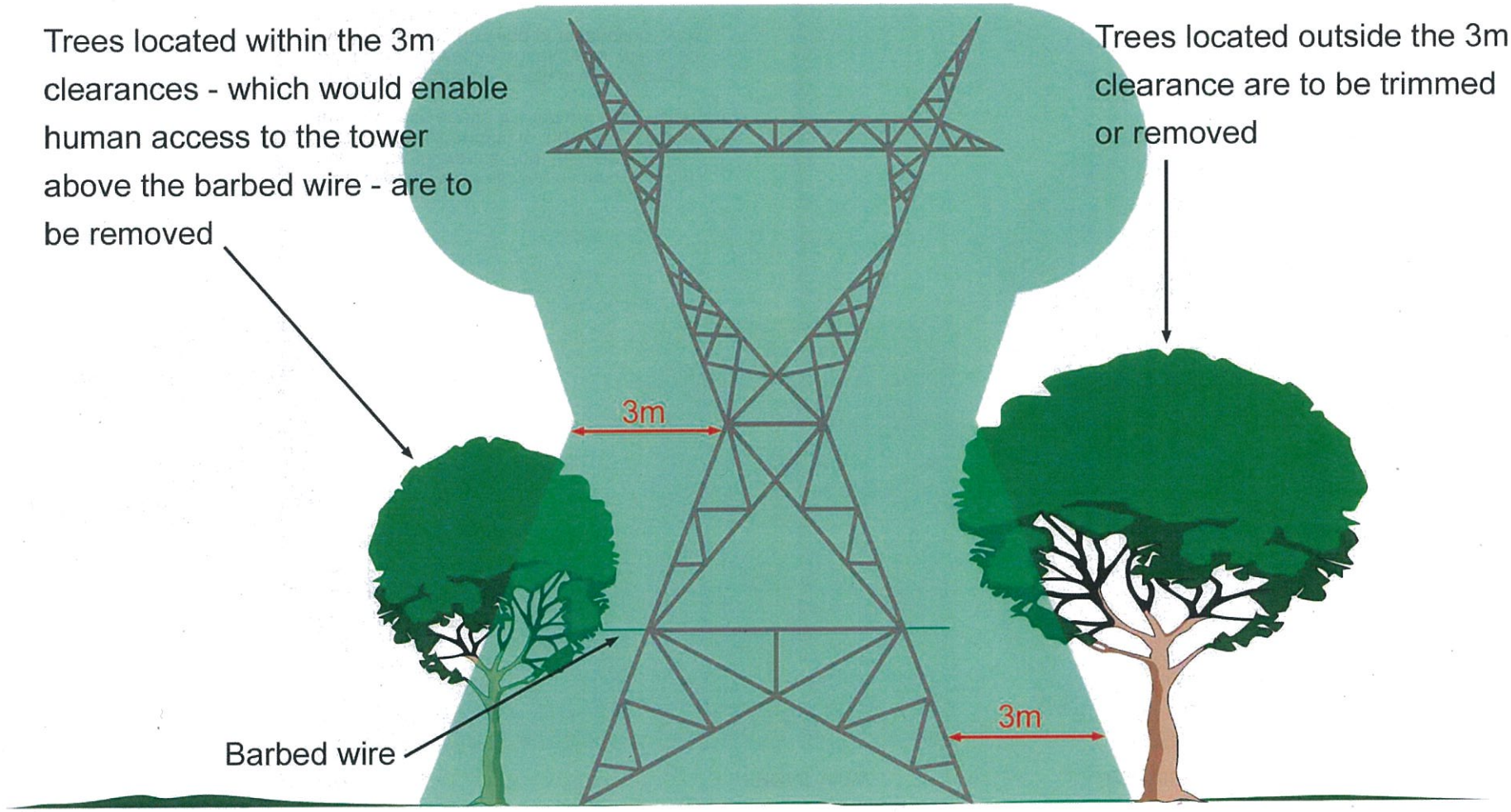
Note 2: Trim any twigs or branches thicker than your thumb (approximately 15mm diameter) which are in the aerial bundled conductor clearance tunnel, or which will encroach into the tunnel within the clearing cycle under still air conditions. The clearance tunnel should take into consideration variation in sag between support structures. (This requirement may not be applicable in Bushfire prone areas at the discretion of the Network Operator).

See Drawing 2 for a diagram showing the application of this table.

4.5 Drawing 3: "Clearances from Streetlights"



4.6 Drawing 4: "Clearances from Tower Structures"



4.7 Table 3: Minimum Safety Clearances from Poles & Tower Structures

Structure	Clearance
Poles	Clearances around all poles of all types and voltages is 2m radius, see Drawings 1,2 & 3.[1]
Tower Structures	3m radius around the tower or a 12m radius from the tower centre whichever is the greater. See Drawing 4 Tower plan.

Note 1: Consideration should be given to retaining vegetation of amenity value but clearances must be achieved to:

- **prevent vegetation contacting the pole;**
- **enable the unhindered climbing of ladders in safe locations; and**
- **ensure that there is adequate clear space for a full excavation and inspection of the below ground area around the pole.**

For clearances around Streetlighting lanterns see Drawing 3.

For clearances around Towers see Drawing 4.

4.8 Table 4. Regrowth allowances

Dependent on species and locality an allowance for growth must be assessed on a case by case basis. These columns indicate the estimated normal additional growth allowance that may be applied in the different vegetation circumstances - see Drawings 1 and 2.

This table gives the allowance for regrowth between inspection / maintenance cycles.

Location	Shrubs and mature trees	Typical native and introduced vegetation	Fast growing species in favourable environments and lopped vegetation
Urban areas where trimming cycles are short, typically annual	0.5m.	1m	2m
Rural areas where trimming cycles are longer, typically 3 years.	1m	3m	6m

4.9 Additional clearances in Non-Urban / Bushfire Prone areas

Clearing vegetation above the conductors ("clear to sky"), in accordance with Drawing 1, should be implemented wherever possible in Non Urban / Bushfire prone areas. Consideration may be given to reduce this requirement where there is an occupied property within 25m of the lines.

At the discretion of the Network Service Provider an allowance of 0.5m may be added to the minimum safety clearances in Table 1 for bare conductors in Non Urban / Bushfire prone areas. This allowance is added to the minimum safety clearances before regrowth allowances are applied.

Other strategies such as specific maintenance or inspection cycles may be used instead of, or in conjunction with, the 0.5m suggested, based on the risk management profile of the network operator.

5. APPENDIX A: NSW Heritage Register Criteria

An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the criteria shown in the box below. While all criteria should be referred to during the assessment, only particularly complex items or places will be significant under all criteria. In many cases, items of environmental heritage will be significant under only one or two criteria.

In using these criteria it is important to assess the values first, then the context in which they are significant. Decide the appropriate context by considering similar items of local and State significance in each of these contexts. These criteria were gazetted following amendments to the *Heritage Act 1977* which came into force in April 1999. The Heritage Council determines the criteria for State significance and issues guidelines to assist in their application.

Criterion (a) -	an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);.
Criterion (b) -	an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
Criterion (c) -	an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);
Criterion (d) -	an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;
Criterion (e) -	an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
Criterion (f) -	an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);
Criterion (g) -	an item is important in demonstrating the principal characteristics of a class of NSW's: • cultural or natural places; or • cultural or natural environments. (or a class of the local area's: • cultural or natural places; or • cultural or natural environments.) An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register

Different components of a place may make a different relative contribution to its heritage value. Loss of integrity or condition may diminish significance. In some cases it may be useful to specify the relative contribution of an item or its components.

Other criteria for significance for a tree or group of trees are any of:-

- It/they make/s an important contribution to the character or amenity of the local area;
- It/they is/are indigenous to the local area and its species is listed under the *Threatened Species Conservation Act 1995*; or
- It/they represent/s an important habitat for native fauna; or
- It/they is/are part of a wildlife corridor or a remnant area of native vegetation;
- It/they is/are important to the maintenance of biodiversity in the local environment; or
- It/they is/are a notable visual element to the landscape of a local area.

6. APPENDIX B: Additional Reading

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Tree Safety Management Plan

(Prepared as a Tree Management Plan in accordance with Part 5 of the Electricity Supply (Safety and Network Management) Regulation 2014, under the Electricity Supply Act 1995)

December 2014

Tree Safety Management Plan

December 2014

CONTENTS

1 INTRODUCTION

1.1 Who is Ausgrid?

Ausgrid is a statutory State-Owned Corporation, incorporated under the Energy Services Corporations Act 1995 (NSW).

One of our main functions is to distribute electricity. We are supplied with bulk *high voltage* electricity that we break down to lower voltages and distribute to customers.

Ausgrid's distribution *Network* supplies over 1.66 million customers and extends to over 41 local *Council* areas. Ausgrid's *Network* includes *powerlines* running along streets and easements and into homes and other properties, as well as streetlights, power poles, access tracks and steel towers. Ausgrid's *Network* does not include private poles and wires forming part of customers' electrical installations.

Ausgrid was formed in 1995, when Sydney Electricity merged with Orion Energy following the State Government's rationalisation of NSW electricity distributors.

Ausgrid supplies a significant proportion of the Australian electricity market, covering a distribution area of some 22,275 square kilometres from the Royal National Park south of Sydney to Port Stephens in the north, west to the municipality of Auburn and north west to the upper Hunter Valley.

Ausgrid services a community of almost 3.57 million people with a wide span of customers, ranging from rural to urban, residential to commercial, as well as serving industries such as mining, manufacturing and agriculture.

Ausgrid also has:

- 43% of the NSW market based on electricity consumption;
- Approximately $16.2 billion total assets (gross);
- 36 Sub-transmission Substations;
- Over 5,000 km of Sub-transmission Circuits (overhead and underground) and 201 Zone Substations;
- Approximately 19,000 km of 22kV, 11kV & 5 kV circuits (overhead and underground) and 31,100 Distribution Centres;
- Approximately 18,000 km of low voltage circuits (overhead and underground) and 10,000 km of street lighting circuits; and
- Approximately 507,000 poles in service.

1.2 What is this Tree Safety Management Plan about?

This Tree Safety Management Plan outlines Ausgrid's approach to *vegetation* management near Ausgrid's *Network*. It covers areas such as:

- Why we have a Plan, to whom and where it applies, and when it will be implemented

- How you can have your say
- Raising community awareness
- Use of Contractors
- Emergencies
- Environmental issues
- Alternatives to trimming or removal
- Safety
- Responsibilities
- Notification of upcoming works
- Auditing
- Planting guidelines
- Our approach to trimming and removal
- Costs

1.3 Why have a Plan?

This Plan will help Ausgrid to enhance *vegetation* management practices, inform the community about what Ausgrid does, why Ausgrid does it and to provide the basis for community input. The Plan will operate as a Tree Management Plan under the Electricity Supply (Safety and Network Management) Regulation 2014. By implementing this Plan, Ausgrid will better:

- minimise the possibility of accidental electrocution;
- minimise environmental harm, including minimising damage or destruction of *vegetation*;
- reduce the risk of fires caused by electricity; and
- prevent destruction, damage or interference with Ausgrid's *Network* and as a result, reduce the risk of power interruptions to the community.

Our aim is to minimise the impacts of our *vegetation* management activities on all areas of the environment by implementing appropriate management practices. Ausgrid's primary driver for *vegetation* management is to ensure public safety and enable the safe maintenance and operation of Ausgrid's *Network*.

The Plan seeks to provide a comprehensive overview of Ausgrid's *vegetation* management policies and practices. It is not intended to fully detail Ausgrid's *vegetation* management procedures and contractual arrangements.

1.4 Application of this Plan

This Plan applies across Ausgrid's entire distribution *Network* and area, including *urban*; *rural*, public and private lands.

Across Ausgrid's *Network*, there are various organisations and individuals with *vegetation* management responsibilities, in addition to Ausgrid's own responsibilities. These include *Councils*, landowners (both public and private) and other land occupiers. This Plan sets out the responsibilities of the various groups and describes how Ausgrid plans to interact with them. While the Plan applies directly to Ausgrid, it offers guidance to the other groups.

This Plan has been implemented following consideration of community comment.

1.5 The Meaning of words and expressions used in this Plan

Words and expressions which appear in italics are explained in Attachment 1 - Definitions at the end of this Plan.

1.6 What are 'Related Documents'?

The documents in the attachments (including a list of legislation and other reference documents) are referred to as "Related Documents". They are relevant to this Plan but do not form part of the Plan. These Related Documents may be amended at any time. If this occurs this Plan will be deemed to refer to the latest version of the Related Document. Generally an amendment to a Related Document will not require an amendment to this Plan (unless the change materially affects any provisions of this Plan).

1.7 Reviewing and amending this Plan

This Plan will be reviewed periodically, particularly where there are significant changes to factors such as legislation, policy, industry practice, standards and responsibilities.

This Ausgrid Tree Safety Management Plan may be amended or replaced by a subsequent Plan.

1.8 Feedback on this Plan

Written submissions on this Plan can be made at any time. Submissions will be considered when the Plan is next reviewed.

Written submissions and any other comments should be addressed to:

The Chief Engineer
Engineering Division
Ausgrid
GPO Box 4009
Sydney NSW 2001

General enquiries may be made by calling 13 13 65. See Attachment 4 for further details.

2 SAFETY

Maintaining safety around Ausgrid's *Network* is one of Ausgrid's key priorities. Keeping *vegetation*, particularly *tree* branches, clear of *powerlines* and associated infrastructure, for example, water crossing signs, helps prevent injury to people and damage to property. This section outlines the dangers associated with *vegetation* near Ausgrid's *Network* and defines the safety responsibilities of Ausgrid and others planting and managing *vegetation*.

2.1 What are the dangers?

Some of the dangers of *vegetation* near *powerline*s include:

- Branches pushing live *overhead* wires together, causing the wires to short out, burn through and fall to the ground. This is a particular issue during times of high wind or storms;
- Falling branches bringing live wires to the ground;
- Possible ignition of bushfires;
- Accidental electrocution because of *unauthorised* access to live wires (for example, children climbing trees that are too close to wires, or climbing from trees onto attachments to poles and into live wires);
- Electrical injury from touching *vegetation* in contact with *powerline*s, particularly *high voltage powerlines*; and
- Electrical injury if a boat mast or floating crane comes too close, or touches, *overhead powerlines* crossing a navigable waterway where *vegetation* growth has obscured the crossing/warning signage.

Around 23% of all blackouts are caused by environmental factors, often involving *vegetation*.

2.2 What are Ausgrid's safety responsibilities?

Due to the safety risks outlined above, Ausgrid is required to ensure *vegetation* is managed where it is growing into *safety clearance zone*s near Ausgrid's *Network*. It is essential that *vegetation* is kept clear of Ausgrid's *Network*, so that we can deliver a safe and reliable power supply.

Ausgrid complies with the various industry codes of practice relating to *Network* safety and *vegetation* management. In particular, as a licensed electricity distributor, our Network Management Plan[1] requires the safety clearances specified in Industry Safety Steering Committee document ISSC 3 are to be applied for spans up to and including 300m in length. For spans greater than 300m but less than 400m, an additional 0.5m is to be added to the applicable clearance for up to 300m, and an additional 2m for each 100m thereafter until the easement limit is reached. ISSC 3 provides for additional vegetation *safety clearances* in bushfire prone areas.

It should be noted that ISSC 3 specifies that vegetation management work must only be performed by qualified and *authorised* persons working in accordance with Ausgrid's Electrical Safety Rules when *vegetation* is being trimmed near energised *powerlines*.

In addition, Ausgrid considers bushfire risk management to be of critical importance and having a current Bushfire Management Plan[2] available at all times.

[1] Due to the commencement of the Electricity Supply (Safety & Network Management) Regulation on 1 September 2014, Ausgrid's Network Management Plan will be replaced with an Electricity Network Safety Management System in accordance with Australian Standard AS 5577-2013 – Electricity Network Safety Management System.

[2] Ausgrid's Bushfire Risk Management Plan was previously incorporated as Chapter 4 of Ausgrid's combined Network Management Plan. It is now a separate document in its own right. It is an interim document pending the implementation Ausgrid's Electricity Network Safety Management System in accordance with AS 5577-2013 which provides a national framework for the harmonisation of energy safety systems, including the maintenance of network asset integrity, vegetation management and bush fire risk mitigation.

2.3 What safety responsibilities do landowners and occupiers have?

Customers are responsible for keeping private *overhead powerlines* free of *vegetation* and must ensure appropriate trees are planted in areas that are close to *powerlines*. Customers are also responsible for inspecting, testing and maintaining their *powerlines* and poles at regular intervals – just as we are. Details of Ausgrid's new policy regarding private and shared overhead mains is covered in Section 3.2 of this document.

Landowners and *occupiers* should monitor the *clearance space* between *vegetation* and Ausgrid's *Network* to ensure the *clearance space* is kept free of *vegetation*.

Ausgrid should be contacted for advice if the *clearance space* is compromised. Where the landowner or *occupier* is responsible for *vegetation* management, then they should either enter into an arrangement with Ausgrid or engage an *accredited* or *authorised* Contractor to carry out the work. If landowners and *occupiers* with responsibility for *vegetation* management do not maintain the *safety clearances* or permit Ausgrid to, Ausgrid may arrange for the work to be done and could charge the landowner or *occupier* for the costs, in accordance with the Electricity Supply Act 1995.

Trimming or removal of trees near *powerlines* can be extremely dangerous. If you are arranging any tree trimming within 3m of *powerlines* you should ensure that the work is carried out by suitably qualified vegetation management workers and in accordance with the WorkCover Code of Practice – Amenity Tree Industry.

Any tree trimming performed within 3m of Ausgrid *powerlines* must only be done by workers *accredited* under the WorkCover Code of Practice – Work Near Overhead Power Lines and the work must be carried out according to the Code of Practice. Tree trimming within the No Go Zone (as defined in the Code of Practice) must only be done at the direction of Ausgrid, and vegetation management workers must not enter the No Go Zone at any time unless they are specifically *authorised* by Ausgrid.

Should you require work within the No Go Zone, or if you have any queries about vegetation management near *powerlines*, please contact Ausgrid via our website www.ausgrid.com.au or call us on 13 13 65.

2.4 What safety responsibilities do Vegetation Management Workers have?

Vegetation management workers must be appropriately *accredited* or *authorised* to carry out *vegetation* management work where the *vegetation*, the workers, or the equipment are within 3m of Ausgrid's *Network*. While carrying out *vegetation* management, workers must not endanger themselves or members of the public and must comply with all relevant legislation, codes of practice and safety procedures. In particular, workers must follow the requirements of Ausgrid's Electrical Safety Rules (for work carried out by or on behalf of Ausgrid), or the WorkCover Code of Practice – Work Near Overhead Power Lines (for work carried out by external parties).

2.5 What safety responsibilities do people planting vegetation near Ausgrid's Network have?

In general, *trees* and other tall-growing *vegetation* should not be planted near Ausgrid's *Network.* Planting low-growing shrubs is preferred as it will minimise future hazards.

Refer to Attachment 2 of this document for guidance on what to plant near Ausgrid's *Network*.

3 GENERAL CONSIDERATIONS

This section describes Ausgrid's approach to improving the community's understanding of *vegetation* management issues, Ausgrid's expectations of landowners and *occupiers* in regard to this Plan, the steps Ausgrid takes regarding *vegetation* trimming and removal, Ausgrid's use of qualified Contractors and how Ausgrid will audit their work to ensure standards are maintained and the process is enhanced.

3.1 How can Ausgrid improve Community Understanding of Vegetation Management issues?

Ausgrid will continue to promote safety and environmental issues relating to the planting and management of *vegetation* near Ausgrid's *Network* to increase customer and community understanding.

Ausgrid will:

- liaise with landowners and *occupiers*, state and local government bodies (regulators, *Councils*, fire control bodies) and other community-based environmental organisations such as Landcare and Bushcare groups, as appropriate;
- distribute brochures and posters covering safety issues, clearances, trimming techniques and planting guidelines;
- distribute media articles and place advertisements;
- provide information on Ausgrid's website www.ausgrid.com.au;
- include tips on Ausgrid accounts; and
- respond to community enquiries.

3.2 Ausgrid's Overhead Private and Shared Mains Policy

As referenced in Ausgrid's Network Management Plan, Ausgrid inspects, tests and maintains the assets we own.

Customers are responsible for keeping the *powerlines* which they own free of vegetation, and must ensure appropriate trees are planted in areas that are close to *powerlines*. Customers are also responsible for inspecting, testing and maintaining their *powerlines* and poles at regular intervals – just as we are.

Ausgrid is developing a policy in regard to the inspection of privately owned overhead *powerlines*. The policy will take into consideration the risks associated with these privately owned assets, including bushfire risk.

In cases where customers have not rectified safety defects that have been identified, it may be necessary for Ausgrid to disconnect these *powerlines*. This may include removing any overhead service line to the customer's installation. Even when a service has been disconnected, the landowner/occupier remains responsible for maintaining the customer installation in a safe condition.

3.3 What are Ausgrid's expectations of Landowners and Occupiers?

Landowners and *occupiers* should review the requirements of this Plan (particularly regarding the location and planting of appropriate species and the monitoring of *safety clearances*) and make arrangements for timely *vegetation* management works where they are responsible.

3.4 What steps will Ausgrid take regarding trimming and removal?

Ausgrid will seek to resolve *vegetation* management issues, particularly regarding trimming or removal of *vegetation*, directly and on a cooperative basis with the responsible landowner or *occupier*.

However, Ausgrid may carry out trimming or removal work if:

- it is considered necessary to ensure safety, prevent damage to Ausgrid's network and to maintain power supply; and
- the responsible landowners or *occupiers* do not arrange for the work to be performed and/or grant permission for the work to be carried out.

If this occurs the landowner or *occupier* may be responsible for the associated costs.[3]

3.5 Will notification be given before Vegetation Management is carried out?

Ausgrid will provide notices in accordance with its legal obligations. Ausgrid or its Contractors will keep relevant local government authorities fully informed at all times of their activities, work locations and nature of the work being carried out.

Ausgrid will provide notice to the Office of Environment and Heritage (OEH) for inspection, maintenance and emergency works on land reserved and acquired under the National Parks and Wildlife Act 1974 (NPW lands) in accordance with any agreed procedures.

As Ausgrid's Contracts require the continual *maintenance* of *vegetation safety clearances* and do not involve planned work carried out to a defined schedule, written notification to residents on and adjacent to any site where *vegetation* is to be cleared is not required. However, where any work is to be carried out that will substantially damage a *tree*, defined by the Electricity Supply (Safety and Network Management) Regulation 2014, Part 5 - Tree Preservation, a notification process shall be followed under the Electricity Supply Act 1995. This Clause does not impact on the requirements for notification of electrical work on private property.

Under the Electricity Supply Act 1995, a tree situated on any premises that could destroy, damage or interfere with its electricity works, or could make its electricity works become a potential cause of bush fire or a potential risk to public safety, may be trimmed or removed.

On land where Ausgrid does not have an easement or ownership, a written notice to the owner or occupier of the premises requiring the owner to trim or remove the tree may be made. If the work is not carried out as required by the notice, the network operator may carry out the work itself. In an emergency, Ausgrid, at its own expense, may trim or remove the tree itself.

3.6 What will Ausgrid do in an Emergency?

Trees and other *vegetation* may need to be trimmed or removed under *emergency* conditions where the *trees* or *vegetation* could destroy, damage or interfere with Ausgrid's *Network* or could make Ausgrid's *Network* become a potential cause of bush fire or risk to public safety. In such an *emergency*, *trees* and other *vegetation* may be trimmed or removed without notice.

3.7 Are suitable Contractors used?

Ausgrid contracts out a large portion of its *vegetation* management activities. All of the contracting companies working for us must be able to meet a range of requirements, including appropriate certifications, expertise and experience, as well as health, safety and environmental management methods. Contract personnel receive arboricultural training in correct trimming techniques, additional job-specific electrical safety training and awareness training in our environmental management practices. In addition, Contract personnel are required to successfully complete a *vegetation* management course approved by Ausgrid prior to being *authorised* to undertake trimming near Ausgrid's *Network*.

Contractors are required to employ at least one arborist and one horticulturist to be available within the Contract area to oversee trimming activities and to ensure appropriate standards are maintained.

Ausgrid's *vegetation* management Contractors are also required to have in place an Environmental Management System and a Contract-specific Environmental Management Plan (EMP). The Contractors EMP must comply with the requirements of Ausgrid's own standard EMP, which is prepared and updated by Ausgrid's Environmental Services.

The overall aim of Ausgrid's *vegetation* management program is to achieve and maintain the necessary *vegetation safety clearances* whilst taking into consideration, as far as is practicable, the natural habit of the *vegetation* in the interests of its long term health.

3.8 What checks are undertaken on our Contractors?

Ausgrid audits its Contractors on an ongoing basis to ensure appropriate work practices are being maintained and that all contractual and environmental requirements are being met. Contractors are

[3] Under Section 48 of the Electricity Supply Act 1995 Ausgrid can serve a notice on owners and *occupiers* (including local *Councils*) requiring landowners to trim or remove *trees* on their property where those *trees* could destroy, damage or interfere with the Ausgrid's *Network* or make Ausgrid's *Network* become a potential cause of bush fire or a potential risk to public safety. Ausgrid can also perform *vegetation* management where responsible landowners or *occupiers* do not carry out the work. Ausgrid is generally required to pay for works carried out on *trees* planted prior to the installation of Ausgrid's *Network* and *trees* which have propagated naturally.

provided with feedback from Ausgrid audits and this information will also be used to enhance this Plan and Ausgrid's *vegetation* management system.

3.9 Does Ausgrid have in-house expertise?

Horticulturists and arborists are employed by Ausgrid to audit the work of Ausgrid's Contractors and provide advice to *Councils* and the community. This enables Ausgrid to give feedback and to provide timely, specialist advice.

4 ENVIRONMENTAL ISSUES

This section looks at the range of potential environmental factors associated with Ausgrid's *vegetation* management activities. It also describes how Ausgrid intends to manage these factors.

The issues covered include:

- environmental assessment, approvals licences and permits
- *threatened species* populations or communities
- noise and vibration
- waste management
- heritage
- erosion and sediment control
- pollution control
- noxious weeds and pathogens
- visual impact

4.1 Background

Ausgrid maintains an Environmental Management System (EMS), certified to AS/NZS ISO 14001, which establishes a framework for managing Ausgrid's environmental issues and supports Ausgrid's environmental policy.

The EMS requires Ausgrid to identify the environmental issues relating to the activities Ausgrid's carries out and to use a risk assessment process to determine the significance of Ausgrid's impact. This Plan covers the environmental issues associated with Ausgrid's *vegetation* management activities.

Ausgrid aims to implement environmental best-practice while still taking into account other factors such as legislative requirements, community expectations and the use of the most appropriate, cost-effective measures. In addition to the requirements outlined in this Plan, Ausgrid will manage the environmental issues in accordance with their NUS 174C Environmental Handbook for Construction and Maintenance.

Ausgrid or its Contractors will carry out all appropriate environmental assessments and obtain all necessary approvals, licences and permits associated with Ausgrid's *vegetation* management activities. The following sections provide a general overview of some of the most common environmental issues or factors that may arise.

4.2 Environmental Assessment , Approvals, Licences and Permits

Ausgrid or its Contractors will conduct an environmental assessment, where required, and obtain all necessary approvals, licences and permits. Where trees could destroy, damage or interfere with Ausgrid's electrical network Section 48 of the Electricity Supply Act 1995 provides certain exemptions from obtaining local government permit approvals required by Tree Preservation Orders under a local environmental plan (LEP) and certain other environmental planning instruments. Those exemptions, however, do not apply to consents or approvals required under State Environmental Planning Policies (SEPP), certain heritage orders and specific requirements of environmental protection legislation such as the National Parks and Wildlife Act 1974, Threatened Species Conservation Act 1995 and the Fisheries Management Act 1994.

Ausgrid has been granted a permit, under Part 7 of the Fisheries Management Act 1994, which provides an exemption to Section 205 of that Act subject to Ausgrid meeting a number of specific conditions. The permit allows Ausgrid employees or contractors to undertake mangrove clearing works for maintaining the visibility of warning signs, maintenance of access tracks and clearing power lines to maintain statutory clearances.

Ausgrid follows agreed procedures with OEH for the inspection, maintenance and emergency works on land reserved and acquired under the (NPW lands). A list of some of the relevant legislation and environmental planning instruments is set out in Attachment 3, "Reference Documents".

4.3 Heritage

Ausgrid will always act to preserve natural and cultural heritage features including Aboriginal objects and places, non-Aboriginal historic structures and relics, memorial gardens, parks, *tree* plantings and landscapes, including aquatic landscapes, in accordance with relevant statutory requirements such as those contained in the Environmental Planning and Assessment Act 1979, the Heritage Act 1977 and the National Parks and Wildlife Act 1974.

Works would stop immediately where Aboriginal or non-Aboriginal objects are suspected or identified.

Significant, memorial and heritage *trees*, or *vegetation* in *protected areas* and marine environments, may require particular management to minimise potential dangers or damage. Alternatives to trimming, as described in Section 6, will be considered, but trimming may be necessary where other options are not feasible because of technical, economic or aesthetic considerations.

4.4 Vegetation

Ausgrid's goal is to protect and preserve native *vegetation* and in particular *threatened species*, populations and/or communities. Ausgrid will act in accordance with all relevant legislation including the Environmental Planning and Assessment Act 1979, National Parks & Wildlife Act 1974, Native Vegetation Act 2003, Threatened Species Conservation Act 1995 (NSW) and the Environment Protection and Biodiversity Conservation Act 1999 (Cwth).

Ausgrid recognises that in some instances Ausgrid's *powerline* corridors, substations and depot sites can prove to be valuable ecological areas containing *threatened species*, populations or communities of flora and fauna.

4.5 Wildlife Habitat

Ausgrid will prevent or minimise disturbing wildlife habitat such as hollow bearing trees or bush rock. Where wildlife is detected and is likely to be impacted by the works, Ausgrid's Environmental Services will be contacted to undertake an assessment.

Local wildlife rescue organisations will be contacted for the rescue or care of native wildlife.

4.6 Erosion and Sediment Control

Ausgrid will prevent or minimise erosion and sedimentation by limiting disturbance to low-growing species, vegetative ground covers and topsoil. Ausgrid will act in accordance with Managing Urban Stormwater – Soils and Construction (NSW Landcom, 2004), the 'Blue Book'.

Where it is considered erosion may occur, the stumps and the root structures of trimmed *vegetation* will be retained where practical.

Appropriate sedimentation and erosion control practices will be implemented on sites where soil has been exposed and there is the potential for erosion to occur.

4.7 Noise and Vibration

Ausgrid will consider the impacts of noise and vibration on the community. Every effort will be made to minimise any disturbance, while achieving the objectives of the works.

It is generally impractical to provide acoustic screening. For example, some of the work is done some distance off the ground and close to live *powerlines*, but work will be completed as quickly as possible and at appropriate times. *Emergency* work, however, can occur at any time.

4.8 Pollution Control

Disposal of any material by Ausgrid's *vegetation* management workers must be in accordance with all relevant legislation including the Protection of the Environment Operations Act 1997.

These include ensuring watercourses and water bodies are not polluted by materials such as rubbish, felled or cut *vegetation*, toilet waste, silt, fuel spillage, herbicide and herbicide containers. Refuelling operations or decanting of herbicides are to be conducted at least 30m away from watercourses with all appropriate protection methods in place.

Spillage of oil, fuels or chemicals is to be avoided, but where a spillage or leakage has occurred, the relevant Emergency Response Plan or other applicable Ausgrid procedure shall be followed to ensure adequate control measures are implemented and the appropriate notifications are carried out.

4.9 Waste Management

Where possible all waste generated from Ausgrid's *vegetation* management works, unless it is from noxious weeds, will be mulched and reused.

Debris must be disposed of offsite unless site specific requirements allow otherwise. Debris may only be left to decompose naturally onsite where the landowner or *occupier's* written permission has been obtained and it will not present a safety risk.

Where debris from noxious and environmental *weed* species is likely to self-seed, it should be removed to an EPA approved licensed landfill site or treated to prevent propagation. Waste requiring disposal must be appropriately classified prior to lawful disposal.

All waste management related to *vegetation* management will comply with Ausgrid's Waste Reduction and Purchasing Plan (WRAPPs) reporting obligations.

Ausgrid will generally not remove *trees* or branches that are blown down or where a *tree* falls over from natural causes.

4.10 Noxious Weeds and Pathogens

Ausgrid's aim is to prevent or minimise the spread of noxious and environmental *weed*s and pathogens when carrying out *vegetation* management works. Areas which are particularly vulnerable to noxious weeds and pathogens include areas where threatened species are likely to be present, orchards, vineyards, undisturbed bushland, State forests and within or adjacent to protected areas such as National Parks and conservation areas.

Ausgrid will minimise the transport of *weed* materials and seeds by cleaning vehicles and equipment and removing *weed* material following activities in *weed* infested areas. Other methods may also be used to control the spread of *weeds*. These include digging and removal, selective use of herbicides, replanting and re-vegetating with low-growing locally indigenous plants, as well as creating ground cover with leaves and mulch.

Ausgrid will minimise the spread of pathogens in vulnerable areas by cleaning and disinfecting boots, personal items and all components of vehicles and equipment of soil and vegetation.

4.11 Visual Impact

Ausgrid recognises the importance of maintaining local aesthetics and minimising the visual impact of *tree* trimming.

The primary objective of Ausgrid's trimming program is to strike the appropriate balance between maintaining the necessary *safety clearances* and working with the natural habit of each *tree* in the interests of its long-term health where possible. *Safety clearances* and trimming are outlined further in Section 6.

Ausgrid will endeavour to minimise the visual impact on the local area while upholding this primary objective.

Unfortunately it is not always possible to achieve an aesthetically pleasing result, because of:

- the species of *tree*;
- the position of the *tree* i.e. the *tree* has either been planted in close proximity to Ausgrid's *Network*, or even planted directly underneath; and/or
- the lack of *tree maintenance* – where *trees* have not been maintained suitably from a young age and they have grown unchecked near Ausgrid's *Network* it may be necessary to remove large amounts of *vegetation*.

5 PLANTING GUIDELINES

Ausgrid recognises the value of *trees* to local communities and encourages the planting of *trees* to enhance local streetscapes. Where planting is planned near Ausgrid's *Network*, Ausgrid recommends using suitable low-growing *vegetation*. Tall-growing species should be planted away from Ausgrid's *Network* to avoid safety problems and to enable the *tree* to grow to its mature height without the need for trimming.

This section covers issues on planting near Ausgrid's *Network* in both *rural areas* and *urban areas* and offers planting tips. It also provides information on suitable and unsuitable species.

Ausgrid appreciates that all street plantings need to be considered holistically. Ausgrid's recommended list identifies species of *trees* that will minimise the trimming of *vegetation* necessary to avoid encroachment of *safety clearances* near Ausgrid's *Network*. The local *Council* has the overall responsibility to develop appropriate strategies for *tree* plantings in areas under its control or management.

5.1 What should be planted in Rural areas?

Low-growing species can be planted near Ausgrid's *Network* where they will not present a risk to public safety, interfere with Ausgrid's *Network*, pose a bush fire hazard, or restrict access for *maintenance* or repairs. A list of potentially suitable species is listed in Attachment 2. Local Council nurseries and some private nurseries often sell species native to the local area and can provide specific recommendations on low-growing species suited to local conditions.

Ausgrid recommends *Council*s and other landowners and *occupiers* plant tall species away from Ausgrid's *Network* to maintain both safety and access to Ausgrid's *Network* for routine *maintenance* and repairs.

If tall-growing *vegetation* is planted close to Ausgrid's *Network* the *Council* or other landowner or *occupier* may be responsible for any trimming or removal work and the associated costs, in accordance with the Electricity Supply Act 1995.

Locations such as deep gullies are the preferred sites for groups such as LandCare, Bushcare and others, who undertake planting to connect habitats. This helps to ensure that planted *vegetation* will have minimal impact on Ausgrid's *Network*. If this is not practicable then connectivity of habitat should exclude tall-growing species near Ausgrid's *Network*.

5.2 What should be planted in Urban areas?

We recommend only low-growing species are planted near or under Ausgrid's *Network*. Many *trees* are unsuitable for planting under or near *powerlines* because they are likely to present a safety risk and there is insufficient room for the *tree* to grow. Taller *trees* can be planted nearby, provided that they will remain clear of Ausgrid's *Network* when fully grown.

Please note that *Council* approval must be obtained before planting on streets and footpaths.

On private property, only suitable low-growing species should be planted under or near Ausgrid's *Network*. A list of potentially suitable species is outlined in Attachment 2. Local Council nurseries and some private nurseries often sell species native to the local area and can provide specific recommendations on low-growing species suited to local conditions.

Ausgrid will consider including in the list additional low-growing species that may be suggested by *Councils* and other interested parties.

The planting of species which are not listed in Attachment 2 may be negotiated with individual Councils where the Council wishes to plant replacement street trees not on the list in situations such as where mature avenues of significance exist.

5.3 What should you consider before planting?

Ausgrid offers some simple advice to consider before planting:

- look up before planting to identify existing electricity works;
- consider how big the *tree* or other *vegetation* will grow and what could be affected;
- plant taller species furthest away from Ausgrid's *Network* – the rule of thumb is to plant a *tree* no closer than its potential mature height to the nearest point on Ausgrid's *Network* e.g. if the potential

mature height of the *tree* is 10m, then do not plant the *tree* any closer than 10m to the nearest point on Ausgrid's *Network;*

- obtain *Council* approval before planting on streets and footpaths;
- remember that access to Ausgrid's *Network* will be required for *maintenance* and repairs in the future;
- give preference to planting species native to the local area which are often available from Local Council nurseries and some private nurseries;
- plant species that will not invade the surrounding environment;
- plant away from underground pits, pillar-boxes and kiosk transformers so roots don't become a problem;
- investigate whether underground services are present, including Ausgrid's underground power cables;
- contact Dial Before You Dig (www.1100.com.au or phone 1100) for information on the location of cables and other underground infrastructure before digging, particularly on footpaths and streets;
- remember that underground services may also exist on private property – further information is available from Ausgrid's website (www.ausgrid.com.au);
- consider the requirements of other utility and service providers, eg Roads and Maritime Services traffic sight clearances or interference with telecommunications cables; and
- look at the species lists shown in Attachment 2 for guidance on what to plant near Ausgrid's *Network* – local nurseries can offer specific recommendations on low-growing species suited to local conditions.

This guide also applies to planting *trees* near *aerial bundled cables* (ABC).

6 NETWORK OPTIONS AND VEGETATION MANAGEMENT METHODS

Ausgrid is pursuing a number of longer term solutions to minimise the extent of *tree* trimming in its distribution area in the future. For example:

- Ausgrid ensures that underground electricity is installed in all new urban residential developments;
- *aerial bundled cable* which has a smaller *safety clearance* than standard bare *overhead* wires is the standard construction for new and relocated *low voltage overhead* wiring;
- where deemed practical and efficient new *high voltage* wires are placed underground; and
- in some commercial areas, *overhead* wires are placed underground in conjunction with building developments.

This section describes these *Network* options, the indicative costs and also Ausgrid's approach to *vegetation* trimming, including the relevant *safety clearances*, *vegetation* removal and replacement.

6.1 What Network options are available as alternatives to trimming?

To minimise *tree* trimming, Ausgrid is happy to pursue longer-term *Network* options with *Councils* or other landowners and *occupiers.*

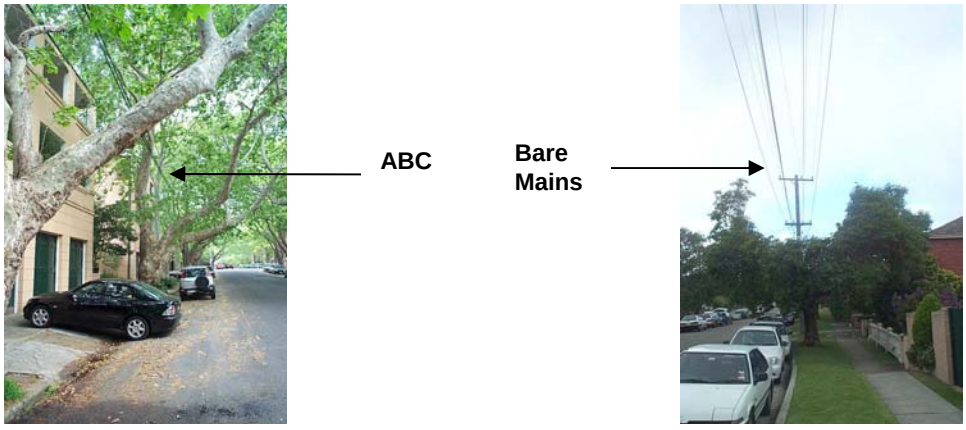
6.1.1 Low Voltage Aerial Bundled Cable (ABC)

By using aerial bundled cables (ABC) significantly reduced *safety clearances* can be maintained between *trees* and the conductors, improving the amenity of the streetscape without compromising safety. Since 2000, Ausgrid has installed more than approximately 300km of *low voltage* ABC.

*Council*s are advised of programmed *tree* trimming works to enable assessment of where extensive trimming is needed to obtain *safety clearance*s. This allows *Councils* to consider replacing bare *low voltage overhead* with ABC in those locations, or investigate whether the *tree*s should be removed and replaced, in consultation with residents. Where it is agreed that ABC will be installed, the *tree* trimming *safety clearance*s will be reduced to 0.5m (instead of 1.5m) from the nearest bare *low voltage overhead* wire, pending the installation of the ABC.

A visual indication of the typical clearances for standard bare conductor *overhead* versus ABC *overhead* is shown in figure 1 below.

Figure 1: Typical clearances for ABC versus bare conductor overhead conductors.



6.1.2 Underground cables

Underground electricity is installed in all new urban residential developments. Where deemed practical and efficient new *high voltage* wires are also placed underground. In some commercial areas, *overhead* wires are placed underground in conjunction with building developments.

6.1.3 Comparative costs

A summary of the comparative costs is shown in Table 1 below.

Table 1: Comparative costs for alternative Network options – Low Voltage Overhead

Comparative Costs for Low Voltage Overhead in an Urban Area (2014 dollars)		
Options	**Indicative Cost**	**Comments**
Trimming, if *overhead* is retained.	$15-$150 per *span* per year	The most economic community outcome provided environmental issues are suitably managed.
Replacing bare overhead wires with *Aerial Bundled Cables* (ABC).	$4,000 to $7,000 per *span* + ongoing trimming costs.	Trimming to reduced clearances will still be required.
Replacing *overhead* wiring with underground cables.	$57,000 to $106,000 per *span*. (Typically 8 customers per *span* at $7,125 to $13,250 per customer.)	Ausgrid considers all requests for undergrounding on a case by case basis in accordance with the “Network Undergrounding Policy Guidelines”.
Relocating *powerlines* to avoid *vegetation* or *vegetation* removal.	Need to be costed on a case by case basis. Could be done on a "beneficiary pays" basis.	Each job is unique. Costs need to be assessed on a range of issues – technical, social and environmental.

Where Councils and other landowners and occupiers decide to pursue other Network options to minimise tree trimming, Ausgrid should be approached to provide advice and specifications relating to the proposed works.

6.2 What are the relevant safety clearances?

Safety clearances are based on industry standards recognised by Industry and Investment NSW. The industry accepted clearances comply with Industry Safety Steering Committee (ISSC) 3 "Guideline for Managing Vegetation Near Power Lines". In residential areas, the *vegetation safety clearance* is typically 1.5 metres around bare *low voltage overhead* wires.

Ausgrid's *vegetation* management program is designed around arboricultural, environmental and safety standards. The trimming techniques used by Ausgrid generally follow AS 4373 - Pruning of amenity trees and are intended to remove the minimum amount of *vegetation* necessary to achieve *safety clearances* whilst preserving the health and safety of the *tree*.

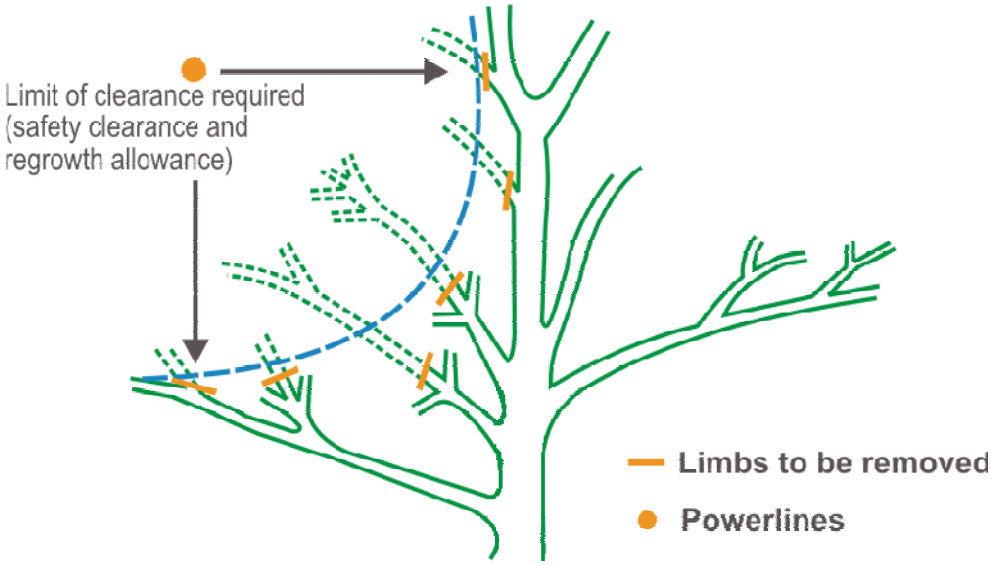
Once the minimum *safety clearanc*e plus an allowance for *regrowth* is determined for each branch, it is then trimmed at the nearest collar (or growth point) outside the limit of clearance. This is a requirement under AS 4373 as it protects *trees* from infection or disease and reduces the development of weakly attached growth that can result from trimming *trees* mid-branch. See figure 2 below.

Current arboricultural techniques discourage the use of "flat-topping". "Flat-topping" leads to large quantities of weakly attached growth (epicormic growth) threatening both *tree* health and public safety. However, in certain environmentally sensitive areas, Ausgrid may agree to undertake "flat-topping" at the request of the land manager or landowner.

"Unbalanced" trimming of *trees* leaving only one side with substantial limbs does not of itself necessarily lead to long term instability in the *tree*, unless the *tree* is already unstable due to factors unrelated to *powerline* trimming, such as root damage. *Trees* showing signs of stress because of pre-existing conditions are assessed for possible removal rather than trimming.

The figure below illustrates the impact of horticultural requirements where *trees* are trimmed.

Figure 2: Relationship between trimming requirements for tree health and clearance distances



Unfortunately it is not always possible to achieve an aesthetically pleasing result, because of:

- the species of *tree*;
- the position of the *tree* i.e. the *tree* has either been planted in close proximity to Ausgrid's *Network*, or even planted directly underneath; and/or
- the lack of *tree maintenance* - where *trees* have not been maintained suitably from a young age and they have grown unchecked near Ausgrid's *Network* it may be necessary to remove large amounts of *vegetation*.

In some cases trimming may prove to be undesirable, such as where *trees* require trimming more often than is practical, or where trimming may impact the health of the *tree*.

Typically a one to three year trimming cycle is considered to be reasonable industry practice, but this may vary depending upon various practical factors. These factors include the rate of *regrowth*, possible fire risk, climate and the type of *vegetation*.

6.3 What are the requirements for underground cables near vegetation?

When installing underground cables, Ausgrid will employ techniques to minimise impacts on tree roots. These techniques include:

1. Trenching outside the SRZ.
2. If trenching will occur inside the TPZ, Ausgrid will underbore or directional drill, hand dig or use an air knife.

Where the above requirements cannot be met, an arborist or horticulturalist will carry out a health and stability assessment of the tree prior to works commencing.

In circumstances where tree roots are impacting on the integrity of Ausgrid's Network and Ausgrid considers that alternative management strategies are not appropriate, a tree may be required to be removed. All vegetation removals will be assessed and supervised by an arborist or horticulturalist and undertaken in accordance with Section **Error! Reference source not found.**.

6.4 What is Ausgrid's approach to vegetation removal?

Ausgrid will not trim a *tree* in a way that substantially damages the *tree*, except in accordance with this Plan and where it believes it is necessary to protect the safety of people or property, or the integrity of Ausgrid's *Network* and it considers that alternative management strategies are not appropriate in the particular circumstances. Alternatives may not be prudent or feasible where there is an immediate threat to safety.

All *vegetation* removals are assessed by an Ausgrid arborist or horticulturalist. If Ausgrid plans to remove *vegetation* on private property, we will consult with the landowner or *occupier* and seek their approval prior to the work starting, except in an *emergency*. The landowner or occupier may be charged for the work. Whilst Ausgrid does not generally require permission from *Councils* for removal of *vegetation* on private property, Ausgrid will generally notify *Councils* of any proposed *tree* removals and allow them to comment on these removals. Consultation and statutory approval from appropriate bodies is necessary where *protected trees* or other *vegetation* need to be removed.

Ausgrid may issue a notice to the landowner or *occupier* to remove *vegetation* if it is, or may be, an ongoing threat to the safety of people or property, or the integrity of Ausgrid's *Network*. In these circumstances permission from *Council* may not be required but where practical, landowners or *occupiers* should verify this with *Council* prior to removing the *vegetation*.

Ausgrid will not remove any *tree*, or trim any *tree* in a way that substantially damages the *tree,* unless it considers:

- other *Network* options are not feasible because of technical, economic or aesthetic considerations;
- safety is compromised;
- the electricity works and supplies are threatened;
- the work is required for access to *powerlines* (including support structures) for construction, *maintenance* or operational needs, or to ensure reliability and staff safety during operation and *maintenance*;
- there is an unsuitable species planted near Ausgrid's *Network*
- the *vegetation* will not respond to directional trimming;
- the *vegetation* cannot be maintained for appropriate periods of time due to its growth characteristics;
- the health of the *vegetation* is such that to leave it would pose a threat to the safety of the community, property or Ausgrid's *Network*; and
- the aesthetics of the *vegetation* are such that continued trimming irreparably damages it, and removal is considered preferable to ongoing trimming.

Council and/or Ausgrid will usually consult with adjoining landowners or *occupiers* and the local community if street *trees* are to be removed.

Ausgrid will generally give notice where the landowner or *occupier* is required to remove a *tree*. Notice is not required in an *emergency* and we may remove the *tree* at our expense.

Ausgrid encourage owners or *occupiers* to seek *Council* permission before removing their *trees* near Ausgrid's *Network* to ensure that the requirements of Tree Preservation Orders under the LEP are fulfilled. Appropriately *authorised* Contractors must be used, as this work can be extremely dangerous. Refer to Section 2 for safety requirements when carrying out this type of work.

Saplings, whose mature height will infringe the *clearance space* or restrict access for *maintenance* or operational requirements, are best removed or relocated at an early stage of their growth to minimise the future safety risks, cost and disruption. Methods used for the reduction of saplings and regrowth that may be used where appropriate include slashing or mulching, hand cutting and biological (such as grazing).

Ausgrid will generally remove *trees* or branches of any species and diameter that are hazardous or unstable and that are located within the *inspection space* and are capable of damaging Ausgrid's *Network*. Such *trees* or branches include those originating from fallen decaying logs or stumps, and any *trees* or branches with obvious symptoms of advanced decline i.e. excessive dieback, sparse leaf cover or major decay fungi.

The following strategies may be used to mitigate the impact of the removal process:

- Replacement with a suitable species prior to the removal of the unsuitable species.
- For a group of *trees*, a staged removal, with staged replacement, is preferable as this reduces the visual impact.
- Removal of the *vegetation* and subsequent replacement.
- Replacement planting on the other side of the street prior to any removal.
- Consultation with the community.

6.5 What is Ausgrid's approach to the replacement of trees?

Ausgrid encourages the replacement of *trees* that are removed, provided the *trees* are planted away from Ausgrid's *Network*. Planting should be in line with Attachment 2 of this plan. We will consider supplying replacement *trees* but we will generally not replace *trees* that have been planted inappropriately after Ausgrid's *Network* was built.

Replacement *trees* will usually be a small size, as these plants generally establish better and more quickly and over several years will outgrow a plant that was larger initially.

Ausgrid encourages the replacement of *trees* with species that are native to the local area. This will assist in the preservation of the local ecology.

7 COSTS

Where there is no negotiated agreement in place with Ausgrid, costs for *vegetation* management may be allocated in accordance with the responsibilities allocated under the Electricity Supply Act 1995.

Ausgrid's preference is to establish negotiated agreements with *Councils*, where appropriate, which seek to work co-operatively to meet the needs of both Ausgrid's *Network* and the surrounding environment. The aim of negotiated agreements is to:

- establish the purpose and objectives of the agreement;
- define each party's responsibilities for the costs of maintaining *safety clearance*s for the various types of *vegetation* (natural, planted and private);
- define the costs and payment schedule for the life of the agreement, for Ausgrid to maintain *safety clearance*s on behalf of *Council*;
- provide for the staged removal and replacement of unsuitable *vegetation*;
- eliminate situations where *Councils* approve the planting of unsuitable *vegetation* near Ausgrid's *Network*;
- define the terms of the agreement; and
- define the basis for ending the agreement.

ATTACHMENT 1 – Definitions

The words and expressions noted below have the corresponding meaning in this Plan:

Access Track	A dry weather 4WD or pedestrian access track that has been previously established for the purposes of accessing the *Network.*
Accredited	Workers accredited under the WorkCover Code of Practice – Work Near Overhead Power Lines
Aerial Bundled Cable (ABC)	An insulated multi-core cable, often used in substitution for multiple bare single conductors
Authorised	Authorised by Ausgrid
Clearance Space	A space of specified dimensions surrounding Ausgrid's *Network* (the dimensions depend upon factors such as the *powerline* type and the voltage carried), which must generally be kept clear of *vegetation* at all times. Exceptions are permitted where there is an assessed minimal risk of: - damage to or interference with Ausgrid's *Network* - bushfire - loss of visibility of water crossing signs - reduced safety
Clearance Zone	The zone surrounding Ausgrid's *Network* comprising the *clearance space* and the *inspection space* (see also *Safety clearance*).
Council	The Council of a local government area.
Easement	An area that is a defined and limited right that allows one party to use a portion of land that is owned by another party. Common examples are rights of way, drainage easements and easements for services. Easements are created in accordance with the Conveyancing Act 1919 and the Real Property Act 1900. They may be created for a definite period of time or in perpetuity.
Emergency	Where Ausgrid has reasonable cause to believe that particular *vegetation* could destroy, damage or interfere with its electricity works, or could make its electricity works become a potential cause of bush fire or a potential risk to public safety, and that urgent corrective action is required to manage the *vegetation* appropriately.
High Voltage	Any voltage which is nominally more than 1000 volts alternating current.
HV	*High voltage.*
Inspection Space	The area outside the *clearance space* that may also require clearing to maintain safety and electricity supplies.
Kilovolt	1000 volts.
kV	*Kilovolt*s.
Low Voltage	Not more than 1000 volts alternating current.
LV	*Low voltage.*
Maintenance	Activities or works that keep Ausgrid's *Network* in good condition and allow its unimpaired operation. This includes *vegetation* management activities.
Naturally Propagated	*Vegetation* that has grown by natural seeding, including by birds or animals.
Network	For the purposes of this Plan, means all those elements of Ausgrid's electrical infrastructure associated with the distribution and supply of electricity. This includes, but is not limited to, *powerline*s, pilot cables, streetlights, poles, standards, stay wires, and substations and transformers.

Occupier	A person who is in actual occupation of the land.
Overhead	In relation to a *powerline*, means a *powerline* that is above ground level.
Powerline	An electric line, structure and equipment used for or in connection with the supply of electricity. It excludes telecommunication cables.
Protected area	An area within: - a national park or nature reserve within the meaning of the National Parks and Wildlife Act 1974 or - land that is reserved or zoned for environmental protection purposes under the Environmental Planning and Assessment Act 1979 or - a public reserve within the meaning of the Local Government Act 1993.
Protected Tree	A *tree* that is the subject of or within an area, as defined in Section 48 of the Electricity Supply Act 1995, that is the subject of an interim heritage order, or a listing on the State Heritage Register, under the Heritage Act 1977 or an order in force under section 136 of the Heritage Act 1977*;* or an interim protection order under the National Parks and Wildlife Act 1974; or a protection conferred by any similar law. It also means a *tree* within a *protected area*
Regrowth	*Saplings*, suckers and other *vegetation* that has grown or regrown after previous control works
Rural area	Any area that is not an *urban area*
Safety Clearance (Zone)	The zone surrounding Ausgrid's *Network* comprising the *clearance space* and the *inspection space*
Sapling	An immature tree
Span	The *overhead* wires between two adjacent supporting poles or structures
SRZ	Structural Root Zone – the circular area around a tree at ground level with radius in metres, computed by SRZ = $0.64x(50 \times \text{diameter(m)})^{0.42}$, where trunk diameter is measured at tree base.
Threatened species, populations or communities	A species or community specified under the Environmental Protection and Biodiversity Conservation Act 1999 (Cwth), Threatened Species Conservation Act 1995 or Fisheries Management Act 1994
Tree	A tree taller than 3 metres, or having a canopy more than 3 metres in maximum diameter or having a trunk with a circumference at a height of 1 metre from the ground of more than 0.3 metres. Trees can include shrubs and other plants for the purposes of the Electricity Supply Act 1995 (NSW)
TPZ	Tree Protection Zone – the circular area around a tree at ground level with radius equal to 12 x the diameter of the tree trunk measured at 1.4 m above the ground.
Unauthorised	Not *authorised* by Ausgrid
Urban Area	The built up areas within and surrounding cities and towns. It includes suburban areas
V	Volts
Vegetation	All plant life including, but not limited to, *trees*, palms, vines, shrubs, and grasses such as bamboo but excluding lawns
Weed	Those species of plant defined as noxious or environmental weeds under the Noxious Weeds Act 1993

ATTACHMENT 2 - Plants generally suitable for use near Ausgrid's Network

Botanic Name	Common Name	Height (metres)	Cultural notes
Acacia boormanii	Snowy River Wattle	3 - 4	Suit highlands planting
Acacia cardiophylla	Wyalong Wattle	2 - 5	Good for Western Slopes region of NSW
Acacia floribunda	White Sallow Wattle	3 - 6	Fast growing, suit coastal areas, frost tolerant
Acacia rublda	Red Stem Wattle	2 - 3	Suit highlands planting
Acacia spectabilis	Mudgee Wattle	3	Suit highlands planting
Acacia vestita	Hairy Wattle	3 - 4	Suit highlands planting
Acer palmatum	Japanese Maple	4 - 5	Deciduous tree with finely textured foliage
Acer platanoides 'Globosum'	Designer Maple	5 - 6	
Acmena smithi var 'Minor'	Dwarf Lilly Pilly	3 - 4	Shade tolerant, hardy, drought tender
Albizia julibrissin	Silk Tree	5 - 6	Deciduous tree with ferny foliage and masses of pink flowers
Amelanchier lavis	Snow Cloud	6	Suit highlands planting
Angophora hispida	Dwarf Apple	2 - 4	Hardy, drought resistant, light frost resistant, coastal
Banksia collina	Hill Banksia	3	Drought tender, heavy frost resistant, coastal
Banksia ericifolia	Health-leaved Banksia	3	Very hardy, drought resistant, heavy frost resistant
Banksia marginata	Silver Banksia	4 - 5	Dark green leaves with silver underneath, suits dry areas
Banksia robur	Swamp Banksia	1.5 - 2.5	Suit highlands planting
Buddleia davidii	Butterfly Bush	3	Purple clusters of flowers, not suitable for Blue Mountains area
Callistemon 'Endeavour'	Endeavour Bottlebrush	2	Suit highlands planting
Callistemon 'Harkness'	Bottlebrush	4	Suit highlands planting
Callistemon citrinus	Crimson Bottlebrush	1.5 - 5	Very hardy, drought resistant, heavy frost resistant
Callistemon linearis	Narrow-leaved Bottlebrush	2.5 - 4	Very hardy, drought resistant, heavy frost resistant
Callistemon paludosus	River Bottlebrush	2 - 3	Hardy, drought tender, heavy frost resistant+F58
Callistemon pinifolius	Green Bottlebrush	2 - 4	Very hardy, drought resistant, heavy frost resistant, coastal
Callistemon salignus 'Eureaka'	Eureka Willow Bottlebrush	4 - 5	Bright pink flowers papery bark tolerant to most soils
Callistemon speciosus	Showy Bottlebrush	2 - 4	Large deep red flowers
Callistemon viminalis	Weeping Bottlebrush	4	Red flowers pendulous habit many cultivars
Callsitemon 'Kings Park Special'	Bottlebrush	5	Red flowers, quick growing, fauna attracting
Camellia japonica	Japanese Camellia	4 - 6	Variety of flower colours
Camellia sasanqua	Sasanqua Camellia	4 - 6	Variety of flower colours
Catalpa bignonioides 'Nana'	Designer Catalpa	4	Heart shaped leaves
Cercis canadensis 'Forest Pansy'	Redbud	4 - 5	Drought tolerant, masses of pink flowers

Botanic Name	Common Name	Height (metres)	Cultural notes
Cercis siliquastrum	Judus Tree	6 - 7	Max 4 metres in Tablelands, suit highlands and bushfire-prone planting
Cersis chinensis	Chinese Redbud	4 - 6	Bright pink flowers
Citrus spp	Citrus	4 - 6	Fruit bearing
Cornus bayleyi	Dogwood	3	Suit highlands planting
Dais continifolia	Pompom Tree	4 - 5	Showy mauve-pink flowers in summer
Escallonia cultivars	Escallonia	3 - 5	Tree like shrubs, suit highlands planting
Eucalyptus alpina	Grampians Gum	3 - 6	Recommended for bushfire-prone areas
Eucalyptus stricta	Blue Mountains Mallee	3 - 5	Good for sandstone/sandy soils
Feijoa sellowiana	Guava	4 - 6	Edible fruiting tree
Fraxinus excelsior 'Nana'	Designer Ash	2 - 4	
Fraxinus ornus 'Meczek'	Designer Ash	5 - 6	
Gleditsia triacanthos var. inermis 'Elegantissima'	Honey Locust	5	
Gordonia axillaris	Fried Egg plant	3 - 5	
Grevillea banksii	Banks Grevillea	3 - 4	Hardy, drought resistant, heavy frost resistant
Grevillea 'Honey Gem'		3	Hardy, light frost resistant, fertiliser sensitive
Grevillea hookerana	Hooker grevillea	3 - 4	Suit highlands planting
Grevillea 'Moonlight'		3 - 5	Hardy, drought resistant, light frost resistant
Hakea dactyloides	Hakea	3 - 4	Hardy, drought resistant, light frost resistant, coastal
Hakea salicifolia	Willow-leaved Hakea	3 - 5	White flowers spring-summer
Hakea sericea	Silky Needle-bush	5 - 6	Suit highlands planting
Hibiscus syriacus	Syrian Rose	3 - 5	Suit highlands planting
Jacksonia scoparia	Jackson bush	3 - 4	Very hardy, drought resistant, heavy frost resistant
Lagerstroemia 'Acoma'	Indian Summer Crepe Myrtle	3	Deciduous tree, showy flowers
Lagerstroemia 'Hopi'	Indian Summer Crepe Myrtle	3	Deciduous tree, showy flowers
Lagerstroemia 'Lipan'	Indian Summer Crepe Myrtle	4	Deciduous tree, showy flowers
Lagerstroemia 'Sioux'	Indian Summer Crepe Myrtle	4	Deciduous tree, showy flowers
Lagerstroemia 'Tonto'	Indian Summer Crepe Myrtle	3	Deciduous tree, showy flowers
Lagerstroemia 'Tuscarora'	Indian Summer Crepe Myrtle	4	Deciduous tree, showy flowers
Lagerstroemia 'Yuma'	Indian Summer Crepe Myrtle	4	Deciduous tree, showy flowers
Lagerstroemia 'Zuni'	Indian Summer Crepe Myrtle	4	Deciduous tree, showy flowers
Lagerstroemia indica	Crepe Myrtle	6	Deciduous tree, pink, mauve, crimson or white flowers and beautiful bark
Leptospermum laevigatum	Coast Tea Tree	3 - 4	Very hardy, drought resistant, coastal
Leptospermum nitidum	Grampians Tea-tree	3	Suit highlands planting
Leptospermum petersonii	Lemon-scented Tea Tree	4	Aromatic leaves and white flowers in summer
Leptospermum polygalifolium	Common Tea-Tree	4 - 6	Masses of creamy-white flowers late spring-summer
Magnolia 'Little Gem'	Dwarf Magnolia	3 - 4	Creamy white flowers, frost tolerant

Botanic Name	Common Name	Height (metres)	Cultural notes
Michelia figo	Port Wine Magnolia	4	Fragrant flowers
Myoporum insulare	Boobiala	4 - 6	Good for coastal areas
Olea europea var 'Europea'	Edible olive	6	Produces edible fruit
Photinia x fraseri	'Robusta' Photinia	4 - 5	White flowers in spring, prune to one or two leaders
Photinia serratifolia	Chinese Hawthorn	4 - 6	White flowers in spring, prune to one or two leaders
Pittosporum revolutum	Yellow pittosporum	3 - 5	Yellow flowers in spring
Prunus fruticosa 'Globosa'	Designer Cherry	<3	White flowers
Prunus x blireana	Purple Leaf Plum	3.5 - 5	Non-fruiting plum
Sambucus nigra	Elderberry	4 - 5	Suit highlands planting
Syzgium luehmannii	Small-leaved Lillypilly	5	Masses of creamy white flowers in summer new growth is pale pink
Tibouchina lepidota	Lasiandra	4 - 5	Masses of velvety royal purple flowers in autumn

Notes:

- Some species in this table may require formal and/or correctional trimming to ensure suitability.
- Minimal clearing of these species may still be required where *powerlines* are relatively low in height, for example, near where they connect to a building.
- This list has been compiled in conjunction with other NSW electricity suppliers and, as such, not all species may be suitable in the Ausgrid supply area.

Additional plants generally suitable for use near Ausgrid's Network

Scientific Name	Common Name	Height (metres)
Acacia buxifolia	Box-leaf Wattle	3
Acacia echinula	Hooked Wattle	2
Acacia elongata		3
Acacia falcata		5
Acacia linifolia	Flax-leafed Wattle	2
Acacia longissima		2-4
Acacia obtusifolia		3
Acacia oxycedrus	Spike Wattle	3
Acacia stricta	Straight Wattle	3
Acacia suaveolens	Sweet-scented Wattle	1.5
Acacia ulicifolia	Prickly Moses	1.5
Banksia aemula		4
Banksia oblongifolia		2
Banksia spinulosa	Hair-pin Banksia	2
Breynia oblongifolia		2-3
Callistemon rigidus	Stiff Bottlebrush	2
Callistemon salignus	Willow Bottlebrush	3-4
Callistemon sieberi	River Bottlebrush	2-4
Dodonea triquetra	Common Hop Bush	2
Exocarpus strictus	Dwarf Currant	2
Grevillea linearifolia	White Spider Flower	2
Grevillea longifolia		2-4
Grevillea mucronulata	Green Spider Flower	1-2
Grevillea oleoides		2
Grevillea sericea subspecies sericea	Pink Spider Flower	1-2
Grevillea speciosa	Red Spider Flower	1.5
Hakea bakeriana		2
Hakea gibbosa		2

Hakea propinqua		2
Isopogon anethifolius		3
Kunzea ambigua	Tick Bush	2-4
Leptospermum emarginatum		2.5
Leptospermum juniperinum	Prickly Tea-tree	1.5
Leptospermum lanigerum	Woolly Tea-tree	3
Leptospermum morrisonii		3-4
Leptospermum parvifolium		2
Leptospermum polyanthum	Slender Tea-tree	2-5
Leptospermum squarrosum		2.5
Leptospermum trinervium	Paperbark Tea-tree	3
Melaleuca diosmatifolia	Pink Honeymyrtle	3
Melaleuca squamea	Swamp Honeymyrtle	1-2
Ozothamnus dendroideus	Tree Everlasting	2-4
Ozothamnus diosmifolium	Paper Daisy	2
Persoonia isophylla		2
Persoonia lanceolata		2
Persoonia levis	Smooth Geebung	4
Persoonia linearis	Narrow-leaved Geebung	3
Persoonia pinifolia	Pine-leaf Geebung	2-4
Pultenaea daphnoides		2-3
Telopea speciosissima	Waratah	2-3

The above table is not exhaustive and is a guide only. Contact the local Council for suitable species native to the local area. Not all of the species listed are native to the whole of the Ausgrid network area and there are many more suitable species native to parts of, or the whole of, the Ausgrid network area.

ATTACHMENT 3 – Reference Documents

The following legislation and documents are relevant to this Plan, but do not form part of this Plan.

- Amenity Tree Industry: Code of Practice – WorkCover (NSW) 1998
- Australian Heritage Council (Consequential and Transitional Provisions) Act 2003 (Commonwealth)
- AS/NZS ISO 14001:2004 Environmental management systems - Requirements with guidance for use
- AS 4373 2007 – Pruning of amenity trees
- AS 5577 2013 – Electricity network safety management system
- Ausgrid CSWI 30/03 Processing Bushfire Related Defects Following a Line Patrol Report
- Ausgrid Electrical Safety Rules
- Ausgrid Network Management Plan / Electricity Network Safety Management System
- Ausgrid's Waste Reduction and Purchasing Plan (WRAPPs)
- Code of Practice for Electricity Transmission and Distribution Asset Management, November 1997, published by the Electricity Association of NSW
- Conveyancing Act 1919
- Electricity Supply Act 1995 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Energy Services Corporations Act 1995 (NSW).
- Environmental Planning and Assessment Act 1979 (NSW)
- Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
- Fisheries Management Act 1994 (NSW)
- Guideline for Land Management Transmission and Distribution Assets, September 2001, published by the Electricity Supply Association of Australia
- Heritage Act 1977 (2010) (NSW)
- Industry Safety Steering Committee (ISSC) 3 – December 2005 "Guideline For Managing Vegetation Near Power Lines", published by the Department Of Energy, Utilities and Sustainability
- Industry Safety Steering Committee (ISSC) 31 – July 2004 "Guideline For Management Of Private Overhead Lines", published by the Department Of Water and Energy
- Local Government Act 1993
- Managing Urban Stormwater – Soils and Construction 1998 (NSW Department of Housing)
- Model Agreement for Local Councils and Utility/Service Providers, August 1999, prepared by the NSW Streets Opening Conference, www.ipwea.org.au/streets
- Native Vegetation Act 2003 (NSW)
- National Parks and Wildlife Service Act 1974 (NSW)
- National Parks and Wildlife (Land Management) Regulation 1995 (NSW)
- Noxious Weeds Act 1993 (NSW)
- Pesticides Act 1999 (NSW)
- Pesticides Regulation 2009 (NSW)
- Procedures for Power Line Maintenance in Lands Administered by the National Parks and Wildlife Service of NSW, July 1994, produced by the Electricity Association of NSW
- Protection Of The Environment Operations Act 1997 (NSW)
- Protection Of The Environment Operations (General) Regulation 2009 (NSW)
- Real Property Act 1900

- Rural Fires Act 1997 (NSW)
- Soil Conservation Act 1938 (NSW)
- State Environmental Planning Policies (NSW), referred to as SEPPs, including:
- SEPP 4 Development Without Consent And Miscellaneous Exempt And Complying Development
- SEPP 14 Coastal Wetlands
- SEPP 19 Urban Bushland
- SEPP 26 Littoral Rainforests
- SEPP 44 Koala Habitat
- SEPP (Major Projects) 2005
- SEPP 71 Coastal Protection
- Threatened Species Conservation Act 1995 (NSW)
- Tree Trimming and Vegetation Management around Power Lines - brochure
- Urban Erosion & Sediment Control Field Guide (NSW Dept of Environment and Climate Change)
- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2011 (NSW)
- Work Near Overhead Power Lines: Code of Practice – WorkCover (NSW) 2006

ATTACHMENT 4 – How to Contact Ausgrid

Call us

Emergency Service	13 13 88	(24 hours, 7 days)
General enquiries	13 13 65	(8am-8pm Monday to Friday, 8:30am-12noon Saturday)
Faulty street lights	1800 044 808	(24 hours, 7 days)

Write to us

GPO Box 4009
SYDNEY NSW 2001

Visit our website

www.ausgrid.com.au

Your first port of call if you wish to complain about Ausgrid's service is the Customer Call Centre. We have established this service to help you with enquiries and problems.

If the staff at the Call Centre cannot immediately resolve your problem, they will put you in contact with somebody who can. The number for this service is 13 13 65. You can also write, or send a fax, to any of Ausgrid's offices.

In the case of a complaint where you feel you may be entitled to compensation for damage or loss, make sure you retain all details of the incident, including receipts. Request a claim form from Ausgrid on 1800 069 952 between 8:30am and 5pm Monday - Friday. This claim form, which states the basis of the complaint, should be completed and returned to us within 28 working days.

Contacting the Energy Ombudsman

If you have a significant problem with Ausgrid which you feel you can't resolve directly with us, you also have the right to refer your complaint to the NSW Energy Industry Ombudsman. You can request this in your written complaint, or you can contact the Ombudsman yourself on (02) 8218 5200.

The Ombudsman can respond to disputes over the supply of service, billing, credit and payment, disconnection, security deposits, and other disputes not related to capital contributions. The Ombudsman is there to protect your consumer rights in these areas.

ATTACHMENT 5 – Vegetation Management Notifications to Landowners/Occupiers

Ausgrid requires the continual *maintenance* of *vegetation safety clearances* which does not involve planned work carried out to a defined schedule, but *vegetation* growth is routinely audited and minor trimming is undertaken as required to maintain *safety clearances.* As such, written notification to residents on and adjacent to any site where *vegetation* is to be cleared is not carried out.

However, where any work is to be carried out that will substantially damage a tree, defined by the Electricity Supply (Safety and Network Management) Regulation 2014, Part 5 - Tree Preservation Regulation under the Electricity Supply Act 1995, a notification process shall be followed utilising the notification forms in Attachments 6, 7 and 8. These notifications are provided to advise residents that more extensive work is being carried out on behalf of Ausgrid, the reason the work is required, any access requirements and the *vegetation* clearance methods to be used.

ATTACHMENT 6 – Vegetation Clearance Notification (7 To 21 Days)

Tree Trimming for Electrical Safety

Dear Resident at……

Safety around our electricity network is one of Ausgrid's key priorities. Keeping vegetation, particularly tree branches, clear of powerlines and power poles helps prevent injury to people and damage to property. It also reduces the possibility of blackouts occurring.

Ausgrid's Contractor, [insert name], will be trimming trees in your street sometime between seven and twenty-one days from _____ [date]. Tree cuttings will be collected within 48 hours of the work being completed. There is no charge for this service.

If you do not own this property, we would appreciate it if you would let the owner know about this notification immediately.

The vegetation clearance will:

- minimise the possibility of accidental electrocution;
- reduce the risk of fires caused by electricity;
- reduce the risk of power interruptions caused by branches touching overhead wires.

Ausgrid is required to ensure vegetation is trimmed or removed where it is growing into safety clearance zones around its overhead wires and power poles. To maintain safety clearances, we will be trimming trees in the street and on private property that are growing too close to our overhead street wires, poles and streetlights.

Trees are generally pruned to remove the minimum amount of vegetation necessary to achieve safety clearances whilst preserving the health and safety of the tree.

Once the minimum safety clearance plus an allowance for regrowth is determined for each branch, it is then generally cut to the nearest branch collar (or growth point), outside the limit of clearance, in accordance with AS 4373 – Pruning of Amenity Trees.

Where trees have not been appropriately maintained before, extensive trimming may be required. This is because once the minimum safety clearance plus an allowance for regrowth is determined for each branch, it is then trimmed at the nearest collar (or growth point) outside the limit of clearance required, in accordance with the Australian Standard. This protects trees from infection or disease and reduces the development of weakly attached growth that can result from trimming trees mid-branch.

The enclosed brochure contains important information about our tree trimming safety program. Should you require any further information, or wish to discuss our vegetation management operations, please do not hesitate to contact [insert name] on [insert contact number].

We thank you for your co-operation during these important works.

Yours Faithfully,

Name Of Contractor's Representative
Company Name

ATTACHMENT 7 – PRIVATE PROPERTY VEGETATION CLEARANCE NOTIFICATION (7 TO 21 DAYS)

Tree Trimming for Electrical Safety

Dear Resident at……

Safety around our electricity network is one of Ausgrid's key priorities. Keeping vegetation, particularly tree branches, clear of powerlines and power poles helps prevent injury to people and damage to property. It also reduces the possibility of blackouts occurring.

Ausgrid's Contractor, [insert name], will be trimming trees in your street sometime between seven and twenty-one days from _____ [date]. Tree cuttings will be collected within 48 hours of the work being completed. There is no charge for this service.

If you do not own this property, we would appreciate it if you would let the owner know about this notification immediately.

The vegetation clearance will:

- minimise the possibility of accidental electrocution;
- reduce the risk of fires caused by electricity;
- reduce the risk of power interruptions caused by branches touching overhead wires.

Ausgrid is required to ensure vegetation is trimmed or removed where it is growing into safety clearance zones around its overhead wires and power poles. To maintain safety clearances, we will be trimming trees in the street and on private property that are growing too close to our overhead street wires, poles and streetlights.

We need to enter your property to carry out the trimming. We will notify you again two days before work starts. Every effort will be made to ensure the work causes minimum disturbance. On the day work starts, our Contractors will try to contact you (if you are home) to confirm that our entry to your property is convenient. If you are not home, they will go ahead with the work. Please telephone (insert contact number) now if you do not consent to our Contractors entering your property to do this work.

Trees are generally pruned to remove the minimum amount of vegetation necessary to achieve safety clearances whilst preserving the health and safety of the tree.

Once the minimum safety clearance plus an allowance for regrowth is determined for each branch, it is then generally cut to the nearest branch collar (or growth point), outside the limit of clearance, in accordance with AS 4373 – Pruning of Amenity Trees.

Where trees have not been appropriately maintained before, extensive trimming may be required. This is because once the minimum safety clearance plus an allowance for regrowth is determined for each branch, it is then trimmed at the nearest collar (or growth point) outside the limit of clearance required, in accordance with the Australian Standard. This protects trees from infection or disease and reduces the development of weakly attached growth that can result from trimming trees mid-branch.

The enclosed brochure contains important information about our tree trimming safety program. Should you require any further information, or wish to discuss our vegetation management operations, please do not hesitate to contact [insert name] on [insert contact number].

We thank you for your co-operation during these important works.
Yours Faithfully,

Name Of Contractor's Representative
Company Name

ATTACHMENT 8 – PRIVATE PROPERTY Vegetation Clearance Notification (48 Hours)

Tree Trimming for Electrical Safety

Dear resident

Date: ……..

Address:…….

Time: …….

As we have advised previously Ausgrid's Contractor, [insert name], is trimming trees and other vegetation in your area to ensure safety clearance zones around our electricity network are maintained. This helps prevent injury to people, damage to property and reduces the possibility of blackouts occurring.

An inspection of the overhead wires and power poles in your area has revealed vegetation on or adjacent to your property is growing within the safety clearance zones of our street wires.

This means we need to enter your property to carry out the trimming. There is no charge for the trimming and every effort will be made to ensure the work causes minimum disturbance. On the day work starts, our Contractors will try to contact you (if you are home) to confirm that our entry to your property is convenient. If you are not home, they will go ahead with the work. Please telephone (insert contact number) now if you do not consent to our Contractors entering your property to do this work.

Trees are generally pruned to remove the minimum amount of vegetation necessary to achieve safety clearances whilst preserving the health and safety of the tree.

Once the minimum safety clearance plus an allowance for regrowth is determined for each branch, it is then generally cut to the nearest branch collar (or growth point), outside the limit of clearance, in accordance with AS 4373 – Pruning of Amenity Trees.

If you do not own this property, we would appreciate it if you would let the owner know about this notification immediately.

The enclosed brochure contains important information about our tree trimming safety program. Should you require any further information, or wish to discuss our vegetation management operations, please do not hesitate to contact [insert name] on [insert contact number].

We thank you for your cooperation.
Yours Faithfully,

Name Of Contractor's Representative

Company Name

Revision History	
Initial edition:	29/04/2002
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Current edition	xx/12/2014

Document Control	
Authorised By: David Wilkinson Manager – Primary Systems	Date: xx/12/2014
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FAIR WORK COMMISSION

DECISION

Fair Work Act 2009
s.185—Enterprise agreement

Ausgrid
(AG2013/7076)

AUSGRID AGREEMENT 2012

Electrical power industry

SENIOR DEPUTY PRESIDENT HAMBERGER SYDNEY, 27 JUNE 2013

Application for approval of the Ausgrid Agreement 2012.

An application has been made for approval of an enterprise agreement known as the *Ausgrid Agreement 2012* (the Agreement). The application was made pursuant to s.185 of the *Fair Work Act 2009* (the Act).

I am satisfied that each of the requirements of ss.186, 187 and 188 of the Act as are relevant to this application for approval have been met.

The Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia (CEPU), NSW Local Government, Clerical, Administrative, Energy, Airlines & Utilities Branch of the Australian Services Union, Association of Professional Engineers, Scientists and Managers Australia (APESMA), CPSU, Community and Public Sector Union, SPSF Group NSW Branch, Australian Workers' Union, Construction, Forestry, Mining and Energy Union, Mining and Energy Division, NSW Energy District and 'Automotive, Food, Metals, Engineering, Printing and Kindred Industries Union" known as the Australian Manufacturing Workers' Union (AMWU), being bargaining representatives for the Agreement, have given notice under s.183 of the Act that they want the Agreement to cover it. In accordance with s.201(2) of the Act I note that the Agreement covers the organisations.

The Agreement is approved and will operate from 4 July 2013. The nominal expiry date of the Agreement is 18 December 2014.

SENIOR DEPUTY PRESIDENT

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Ausgrid

Agreement 2012

Table of Contents

1 TITLE

This Agreement is to be known as the Ausgrid Agreement 2012.

2 COVERAGE

2.1 The persons covered by this Agreement are:

- Ausgrid
- Employees employed in the classifications listed in this agreement
- Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia [CEPU]
- Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch [USU/ASU]
- Association of Professional Engineers, Scientists and Managers Australia, New South Wales Branch [APESMA]
- Community and Public Sector Union [CPSU]
- Australian Workers' Union [AWU]
- Construction, Forestry, Mining and Energy Union (Mining and Energy Division) NSW Branch [CFMEU]
- Australian Manufacturing Workers' Union (Vehicle Division) [AMWU]

2.2 This Agreement covers employees to the exclusion of the Electrical Power Industry Award 2010, rescinds and replaces all awards and previous Ausgrid Agreements between the persons covered by this agreement including but not limited to the Ausgrid Agreement 2010 including schedules 1 to 4 Inclusive.

2.3 This Agreement shall cover all current and future employees of Ausgrid who are engaged in the classifications set out in Appendix 1 of this Agreement (including any additional classifications introduced in accordance with Sub-clause 2.7). The Unions covered by this Agreement are acting as agents for employees who are members or eligible to be members of the relevant union.

2.4 Ausgrid recognises it is necessary to maintain a solid core workforce of permanent employees with others (e.g. casuals, fixed term, labour hire and contractors) assisting or supplementing where business so demands. Wherever practicable, Ausgrid will endeavour to employ permanent employees.

2.5 This Agreement shall have no application to any employee employed under a Fair Work compliant individual contract as a senior manager.

2.6 This Agreement shall take effect as from 19 December 2012 until 18 December 2014 (the term).

2.7 The persons covered by this Agreement agree to making additions to Appendix 1C 'Classifications', of this Agreement by consent where new employment classifications are created by Ausgrid. In the event that a new employment classification is created by Ausgrid, the persons covered by this Agreement agree that the role shall be evaluated in accordance with Sub-clauses 8.2 - 8.5 to determine the appropriate rate of pay.

2.8 The Persons covered by the Agreement agree that the remuneration payable under this Agreement is in satisfaction of any entitlements or benefits under any award or applicable enterprise agreement that applies to the employees covered by this Agreement.

2.9 The Persons covered by the Agreement agree not to make any claims, in their own right or for or on behalf of any employee, for any entitlements or benefits under any award or other applicable industrial instrument that applies to the employees covered by this Agreement.

2.10 Any remuneration paid by Ausgrid to an employee covered by this Agreement, which is in excess of the legislated basic minimum hourly amount payable to the employee, may be offset against any claim by an employee for entitlements or benefits under any other award or industrial instrument which might be found to apply to the employee.

2.11 Negotiations for a replacement agreement will commence within the 6 month period, but no later than 4 months, before the expiry of this Agreement.

3 DEFINITIONS

3.1 **"Appointed Grade"** means the position to which an employee has been appointed by the Chief Executive Officer other than under the provisions of Clause 44, Higher Grade Pay.

3.2 **"Day Off"** means a day off in accordance with a regular nine day fortnight working period arrangement.

3.3 **"Chief Executive Officer"** means the Chief Executive Officer of Ausgrid.

3.4 **"Medical Officer"** unless specified otherwise, means Ausgrid's Medical Officer or a medical practitioner acting on Ausgrid's behalf.

3.5 **"Ordinary Rate of Pay"** means the rate of pay applicable to the appointed grade of an employee as prescribed in this Agreement and does not include shift allowance, weekend and/or holiday or other penalty rates of pay.

3.6 **"Resignation"** means voluntarily leaving the service of Ausgrid.

3.7 **"Retirement-Age"** means termination of service in accordance with Sub-clause 38.4.

3.8 **"Retirement-Ill Health"** means terminating of service by Ausgrid on account of ill-health, it being certified by Ausgrid's Medical Officer, or a medical practitioner as agreed between the Chief Executive Officer and the Secretary of the Union concerned, that such ill-health renders the employee unable in the future to perform the duties of the employee's appointed position or equivalent.

3.9 **"Rostered Day Off"** means a day off for a shift worker under a shift work roster; or for a day workers, means a week day Monday to Friday on which the employee is not required to work because the employee has worked additional time which has accrued towards a day off.

3.10 **"Service"** means service calculated in accordance with provisions of Clause 39, Calculation of Service.

3.11 **"Trade classifications"** are occupational groups whose members are required to serve an apprenticeship.

3.12 **"Permanent Part-time employee"** means an employee who is engaged for less than full time ordinary hours as prescribed by the Agreement, with regular days and number of hours each week.

3.13 **"Casual employee"** means an employee who is engaged to work on an hourly or daily basis, with a minimum engagement of three (3) hours.

3.14 **"Fixed Term Employment"** means when it is not expected that there will be an on going need for the position. A fixed term employee is one who is engaged for a fixed period.

4 DISPUTE SETTLEMENT PROCEDURE

4.1 Objectives

The objective of the dispute settlement procedure is to ensure:

(a) disputes are resolved at their source and at the lowest possible level;

(b) employees address the issue with their supervisor first;

(c) the dispute remains in the part of the organisation concerned without interference from employees not involved; and

(d) during the course of this procedure the status quo will be maintained by both parties, and without prejudice to either party, work shall continue in the manner and under the conditions it was carried out prior to the dispute arising.

(e) The objective of this DSP is to ensure that disputes relating to the relationship between the employer and employees are dealt with according to this clause.

4.2 Three Tiered System

TIER	LOCAL MATTER	CORPORATE WIDE MATTER
Tier 1 Local Level	Resolution of the issue or dispute is sought at its source with involvement of the following: • supervisor with manager (if required). • employee/s concerned with union delegate (if requested)	
Tier 2 Corporate Level	If unresolved at local level, resolution is sought at a corporate level with involvement of the following: • Union Organiser, relevant local Delegate and Employee/s (if necessary) • Manager/s affected, local manager/s, General Manager People & Services and Manager Employee Relations.	Claims or issues may be raised by either: • Employee/s, • Union/s, or • Ausgrid Resolution of the issues raised should involve: • Relevant member/s of Ausgrid Management and any other necessary resources, and • Union's Organisers and relevant Delegates to ensure input reflects the organisation or the issues

		raised.
Tier 3 Tribunal Level	If the issues remain unresolved the matter may be referred to the Fair Work Commission for conciliation and or arbitration with the rights of the parties to appeal being reserved. The process before the Fair Work Commission must be free from industrial action. The parties may agree that a person other than the Fair Work Commission can deal with a dispute in accordance with section 740 of the *Fair Work Act 2009*. In the absence of such agreement, the dispute will be dealt with by the Fair Work Commission.	If the issues remain unresolved the matter may be referred to the Fair Work Commission for conciliation and or arbitration with the rights of the parties to appeal being reserved. The process before the Fair Work Commission must be free from industrial action. The parties may agree that a person other than the Fair Work Commission can deal with a dispute in accordance with section 740 of the *Fair Work Act 2009*. In the absence of such agreement, the dispute will be dealt with by the Fair Work Commission.

Each tier of the system will be managed in a timely fashion.

4.3 Responsibilities of those Involved in Resolving the Dispute

The responsibilities of the individuals and the organisations they represent should include the following:

(a) to have an appreciation of each other's point of view;

(b) to have an appreciation of each other's needs;

(c) to approach discussions and negotiations in good faith;

(d) Ausgrid, where possible, should take the needs of employees into account when making decisions;

(e) meetings called to try and resolve the issues in dispute should be called without unnecessary delay; and

(f) it is the responsibility of both the representatives of the Union/s and Ausgrid to give the employees progress reports.

5 CONSULTATION

5.1 The term 'consultation' is understood as a process of seeking information, seeking advice, exchanging views and information, and taking the views and information into consideration before making a final decision.

5.2 Consultation regarding workplace change. Ausgrid seeks to continually improve its work processes and where possible to adopt the best practice in terms of efficiency and productivity in all work areas. Ausgrid's employees and their unions commit to supporting and contributing positively to the process of workplace change and improvement and agree not to unduly delay or frustrate the process described within this clause.

5.2.1 Employer to notify:

5.2.1.1 Before Ausgrid has made a final decision to introduce changes in production, program, organisation, structure, technology or policies that are likely to have an effect on employees, the employer must notify the employees who may be affected by the proposed changes and their representatives, if any.

Employees and Unions that may be impacted on by the proposals for change will be consulted and will be able to provide input on how any changes may be implemented.

5.2.1.2 Effects include, but not limited to, termination of employment; changes in the composition, operation or size of the employer's workforce or in the skills required; the elimination or diminution of job opportunities, promotion opportunities or job tenure; the alteration of hours of work including; the need for retraining or transfer of employees to other work or locations; and the restructuring of jobs.

5.2.2 Employer to discuss change:

5.2.2.1 The employer will consult with the employees affected and their representatives, if any, the introduction of the changes in 5.2.1, the effects the changes are likely to have on employees and measures to avert or mitigate the adverse effects of such changes on employees and consider the matters raised by the employees and/or their representatives in relation to the changes.

5.2.2.2 For the purposes of such discussion, the employer will provide in writing to the employees concerned and their representatives, if any, all relevant information about the changes including the nature of the changes proposed, the expected effects of the changes on employees and any other matters likely to affect employees.

If there is any dispute during the abovementioned process then the persons covered by this Agreement agree to resolve the dispute through the resolution procedure at Clause 4.

5.3 The commitment to consultation for change necessarily encompasses a high level of information exchange and sharing information. The persons covered by this Agreement therefore agree to maintain the confidentiality of commercially sensitive information at all times.

5.4 The persons covered by this Agreement may communicate jointly with the employees about issues and achievements, which affect the workplace. They will not unjustly criticise each other or seek to publicly denigrate the views of the other.

5.5 Peak Consultative Committee ("PCC")

5.5.1 The PCC will be established comprising the relevant Senior Executives, Managers of Divisions, Union Officials and Employee representatives to consult with respect to the specific issue/s.

5.5.2 These meetings will focus on but are not limited to, organisational change and workplace reform.

5.5.3 If a matter raised at the PCC is under consideration at another Committee, it may be noted at the PCC.

5.5.4 The PCC shall meet on at least a quarterly basis or on an as need basis; however, members of the PCC shall be afforded a minimum of one (1) weeks notice of any proposed meeting.

5.5.5 The PCC shall have an independent Chair agreed by the PCC members and members shall participate in appropriate training to fulfil their duties. A charter shall be developed by the PCC members and agreed.

Other management representatives and union officials are ex-officio members of this committee.

5.6 Local Consultative Committee ("LCC")

5.6.1 Up to a maximum of five LCCs will be established across the Ausgrid franchise area.

5.6.2 LCCs will discuss matters relevant to the local area. Matters relevant across the company or classifications or applicable to other geographic areas will be referred to the PCC for consideration.

5.6.3 Membership of each LCC will be made up of representatives of management and employee elected employee representatives from the local area work group/classification. Union officials are also invited to attend.

5.6.4 LCCs will meet at least every second month or more regularly if required.

5.6.5 Management will chair the LCCs. Minutes will be taken and shared with committee members and distributed to the other LCCs and the PCC.

5.7 At the commencement of a consultation process on a specific issue, the persons covered by this Agreement will reach agreement on a timetable and process reflecting the nature, circumstances and complexity of the issue.

5.8 The persons covered by this Agreement have the right to refer the matter into the Dispute Settlement Procedure at any time.

6 OUTSOURCING/CONTRACTING OUT

6.1 Basic Principles:

Outsourcing or contracting out will not diminish the working conditions of this Agreement.

6.2 Work will only be outsourced or contracted out when it can be demonstrated that:

6.2.1 peak workloads cannot be met by Ausgrid's workforce including reasonable overtime; or

6.2.2 where specific expertise, not available in Ausgrid's workforce, is required. Where recurring work requires such expertise, Ausgrid will make efforts to obtain this expertise by training and/or reorganising its existing workforce. Ausgrid will keep the relevant union(s) informed about such training and reorganisation; or

6.2.3 the use of outsourcing or contracting out the work is commercially the most advantageous option taking into account safety, quality, performance, and cost.

6.3 In circumstances where Ausgrid is examining outsourcing or contracting out of work activities:

6.3.1 The PCC will serve as a forum for Ausgrid to inform and consult the unions and their members about contracting out and outsourcing proposals;

6.3.2 Ausgrid will advise the employees and their union(s) and provide them the appropriate time (relevant to the nature of the proposal) to respond with suitable proposals in respect of possible alternative arrangements to outsourcing or contracting out;

6.3.3 The persons covered by this Agreement including relevant work groups/employees may, via the consultative process in this Agreement, utilise external benchmarking prior to market testing to permit internal efforts to improve efficiencies and become more competitive. Prior to expressions of interest or tenders being called, where employee generated alternatives are received, such alternatives will be considered;

6.3.4 Expressions of interest or tenders when advertised shall be timed so as to provide the employees with an opportunity to submit a conforming expression of interest or tender. If an employee generated conforming expression of interest or tender is submitted, it will be evaluated together with external submissions consistent with the tendering and probity procedures of Ausgrid.

6.3.5 If it is subsequently determined that expressions of interest or tenders are to be invited, Ausgrid will provide the union(s) with a copy of the document which has been prepared.

6.3.6 In evaluation of conforming expressions of interest or tenders, any comparisons will be made on a basis discounting any overheads that would continue even if the work was outsourced or contracted out. Such overheads would typically include tendering costs, contact administration, contract supervision and the cost of any redundancies which may arise as a result of the decision to outsource or contract out.

6.4 When a decision is made by Ausgrid to outsource/contract out work not already outsourced or contracted out, or in a review of existing contracts, Ausgrid will consider a contract to a contractor that demonstrates:

6.4.1 contractor(s) undertaking the outsourced /contracted out work will have wages and conditions that are no less favourable than that provided for in the contractor's relevant industrial instrument.

6.4.2 it has established appropriate industrial relations policies and practices which promote harmonious employee relations and minimise the risk of industrial disputes and that it complies with appropriate safety standards, environmental standards and quality standards to a level commensurate with the standards Ausgrid expects.

6.4.3 if after engagement of a contractor a person covered by this Agreement provides sufficient evidence that a contractor is not providing its employees with correct statutory entitlements, Ausgrid will use an independent organisation to audit compliance with these entitlements. If the audit

confirms that there is a breach of the statutory entitlements of the Contractor's employees, Ausgrid will take appropriate action.

6.5 In the event that Ausgrid has determined to outsource or contract out work, affected employees will have access to the full range of options available under all relevant Ausgrid policies which apply at the time. These options will include training and / or retraining.

6.6 Any person covered by this Agreement may refer this process to the Dispute Settlement Procedure in this agreement.

6.7 The persons covered by this Agreement will comply with their obligations under clause 5 of this Agreement prior to enacting the above. Nothing in this clause diminishes the obligations under clause 5.

7 WORK HEALTH AND SAFETY

7.1 For the purpose of the clause, the following definitions shall apply:

7.1.1 A "labour hire business" is a business (whether an organisation, business enterprise, company, partnership, co-operative, sole trader, family trust or unit trust, corporation and/or person) which has as its business function, or one of its business functions, to supply staff employed or engaged by it to another employer for the purpose of such staff performing work or services for that other employer.

7.1.2 A "contract business" is a business (whether an organisation, business enterprise, company, partnership, co-operative, sole trader, family trust or unit trust, corporation and/or person) which is contracted by another employer to provide a specified service or services or to produce a specific outcome or result for that other employer which might otherwise have been carried out by that other employer's own employees.

7.2 Where Ausgrid engages a labour hire business and/or a contract business to perform work wholly or partially on Ausgrid's premises, Ausgrid shall do the following (either directly or through the agency of the labour hire or contract business):

7.2.1 Consult with employees of the labour hire business and/or contract business regarding the workplace occupational health and safety consultative arrangements;

7.2.2 Provide employees of the labour hire business and/or contract business with appropriate occupational health and safety induction training including the appropriate training required for such employees to perform their jobs safely;

7.2.3 Provide employees of the labour hire business and/or contract business with appropriate personal protective equipment and/or clothing and all safe work method statements that they would otherwise supply to their own employees; and

7.2.4 Ensure employees of the labour hire business and/or contract business are made aware of any risks identified in the workplace and the procedures to control those risks.

7.3 Nothing in this clause is intended to affect or detract from any obligation or responsibility upon a labour hire business arising under the Work Health and Safety

Act 2011 or the Workplace Injury Management and Workers' Compensation Act 1998.

8 TRAINING

8.1 Skill development and continuous learning is a critical foundation for the continued success of the organisation.

8.2 Changes to an employee's work shall not justify an increase in pay unless the change in the work constitutes such a significant net addition to the work requirements that it warrants creation of or advancement to a new classification. Changes in work value can only arise from changes in the nature of work, the level of skill required or the level of responsibility exercised.

8.3 Whether or not a job warrants re-classification shall be determined by the Manager Human Resource Operations in consultation with relevant persons.

8.4 Where it is determined that the job warrants re-classification the evaluation will be carried out by a properly constituted job evaluation committee. A properly constituted job evaluation committee shall comprise one union representative, a management representative and the Job Evaluation Administrator.

8.5 Competency/Skills-based classification structures will be progressively developed and refined, in line with work and job design, which recognises organisational and employee needs.

However, the persons covered by this Agreement agree there will be no further claims for skills structure reviews with work-value related effect.

8.6 All Competency/Skill-based classification structures will:

8.6.1 provide the basis for pay and progression linked to the acquisition and use of skills within the scope of the classification;

8.6.2 enhance the opportunities for workplace flexibility,

8.6.3 meet the needs of the organisation,

8.6.4 address the joint requirements of improved productivity, quality and performance, and development opportunities for individuals.

8.7 It is recognised that skill and learning differences between specific work areas or locations will exist despite organisation wide requirements for fairness and employee mobility.

8.8 Supporting Mechanisms

8.8.1 To support the competency/skills-based classification structures, employees may be given the opportunity to become skilled in:

8.8.1.1 Workplace Training (the delivery of workplace training);

8.8.1.2 Skill Module Development (the design of competency-based modules);

8.8.1.3 Workplace Assessment (the assessment of competency against agreed competency standards); and

8.8.1.4 Reading, writing, numeracy and spoken communication.

8.8.2 The identification of competency/skill development requirements will be assisted by Ausgrid's performance development system.

8.9 Learning Time

8.9.1 On and off the job learning opportunities will be available to employees to meet the training needs of the organisation.

8.9.2 Wherever practicable, this will take place in normal working time.

8.9.3 Where learning and skill development takes place out of hours, employee family commitments will be taken into consideration.

8.9.4 Payments for learning undertaken outside normal hours will be determined on a case by case basis, prior to commencement of the program. However, when it is agreed, where such training is linked to a competency/skills based structure, payments will be made at the rate agreed between the persons covered by this Agreement, not to be less than ordinary rates.

8.9.5 Penalty rates shall apply to all management-directed and/or regulatory training that occurs outside normal working hours.

9 WAGES & SALARIES

9.1 Employees covered by this Agreement as classified in Appendix 1C are to be paid the appropriate wage or salary according to their approved pay point as per Appendix 1. Wages under this agreement will increase as shown in the table below.

Date	19/12/2012	18/12/2013
Percentage	2.7%	2.7%

9.2 The rates of pay set out in Appendices 1 include an "Ausgrid Allowance". This is set a shown in the table below:

Date	19/12/12	18/12/13
Amount per week	$51.74	$53.14

The payment of such allowance is to take into account the performance of work in relation to heat, height, dirty work, work in confined spaces; work subject to climatic conditions; subject to the lack of the usual amenities and facilities; subject to directions for alterations and variation of starting and/or finishing locations; subject to direction for availability for emergency work outside of ordinary working hours to ensure continuity and for availability for supply; subject to requirements to complete proficiency tests and subject to changes in the system of working.

10 METHOD OF PAYMENT

10.1 Employees shall be paid by direct transfer to a maximum of five major financial institutions, with a registered BSB number.

10.2 Employees shall be paid weekly on the agreed day.

10.3 On termination employees will be paid all wages and entitlements on the date of termination or by agreement.

11 ALLOWANCES

11.1 Qualified Supervisor Electrical Work Allowance

Only paid to employees who are appointed as trades people and who hold a current NSW Qualified Supervisor Electrical Work. The allowance is also payable to employees who were appointed certain positions prior to 10 December 1981 whether or not they hold an electrician licence. The positions eligible for this allowance as at 19 December 2012 will remain eligible for the allowance for the term of this Agreement. The Qualified Supervisor Electrical Work Allowance remains an all purpose allowance. (Appendix 1D Allowances Item No. 28).

11.2 Electrical Safety Rules and Skills Allowance

Only paid to employees who are appointed to electrical positions who have passed the test and knowledge of the rules and who are required to work or supervise or direct work in accordance with those rules. The positions eligible for this allowance as at 19 December 2012 will remain eligible for the allowance for the term of this Agreement. The allowance is also payable to employees who were appointed to certain positions prior to 22 December 1981. Employees will be required to undergo refresher training. Effective on and from 19 December 2000, apprentice electricians are paid the allowance from the date they complete the Electrical Safety Rules Test. ESRA remains an all purpose allowance but is frozen at the rate paid on 16 June 2012. (Appendix 1D, Allowances, Item No. 25).

11.2.1 Employees in trade classifications (as defined) other than electrician are entitled to 80% of the Electrical Safety Rules Allowance paid to electricians. (Appendix 1D, Allowances, Item No. 27).

11.2.2 Pro-rata Safety Rules Allowance paid to Electricity Supply Operatives who have passed an abridged version of the Safety Rules Test. This allowance is calculated at 60% of the Electrical Safety Rules Allowance. To be known as Safety Rules Electricity Operative Allowance (Appendix 1D, Allowances, Item No. 26).

11.3 Plumber's Registration Allowance is paid to an employee who is required to hold a Qualified Supervisor Plumbing Draining and Gas Fitting in the course of employment. Paid for all purposes. (Appendix 1D, Allowances, Item No. 29).

11.4 Employees, other than shift workers, in a continuous process, when in charge of depot, office or telephone during a meal break shall be paid the extra rate set out in (Appendix 1D, Extra Rates, Item No. 13).

11.5 Employees who are required to use materials containing asbestos or to work in close proximity to employees using such material shall be paid the amount in (Appendix 1D, Extra Rates, Item No. 16). This is paid for the disability of wearing protective gear.

11.6 Employees who are engaged in removing asbestos or any method of sealing asbestos shall be paid the amount in (Appendix 1D, Extra Rates, Item No. 17). This is paid for the disability of wearing protective gear.

11.7 Pneumatic machine tool workers in charge of an air-compressor shall be paid the extra rate set out in (Appendix 1D, Extra Rates, Item No. 18).

11.8 Employees engaged on unusually dirty work or work of a particularly offensive nature shall be paid the extra rate set out in (Appendix 1D, Extra Rates, Item No. 20).

11.9 Employees, other than shift workers, in a continuous process, when in charge of plant during a meal break shall be paid the extra rate set out in (Appendix 1D, Extra Rates, Item No. 14).

11.10 Employees who are accredited as an interpreter with the National Accreditation Authority for Translators and Interpreters (NAATI) and are nominated to be paid a Community Language Allowance because they are frequently called on to act as interpreters shall be paid the amount in (Appendix 1D, Extra Rates, Item No. 22).

11.11 Employees engaged in handling silicate of cotton, slag wool, insulwool or other similar loose material shall be paid the amount in (Appendix 1D, Extra Rates, Item No. 19). This is paid for the disability of wearing protective gear.

11.12 Employees appointed to trades positions and engaged in bricklaying, carpentry, painting, plastering, plumbing and sign writing who are required to supply and maintain their own tools of trade shall be paid the tool allowance prescribed from time to time in the appropriate State Award (Appendix 1D, Extra Rates Item No. 30, 31, 32).

11.13 Employees engaged on any chokage and who are required to open any soil pipe, waste pipe or drain pipe conveying offensive material shall be paid the amount prescribed from time to time in the Plumbers and Gas Fitters (State) Award.

11.14 Sustenance Allowance

Where an employee is required to work at a location which is not their usual place of work and are required to stay overnight, and when arrangements have not been made for accommodation, meals and/or general out of pocket expenses paid in advance by Ausgrid then the employee shall be paid the sustenance allowance rate outlined in (Appendix 1D, Extra Rates, Item No. 23). Application of this clause will be provided to the employee in writing prior to the employee being required to work at a location that is not their usual place of work, including an overnight stay.

12 PRODUCTIVITY AND WORK PRACTICE DEVELOPMENT

12.1 Productivity and work practice development is the foundation of Ausgrid continuing to be a safe workplace and reliable supplier to our customers.

12.2 Ausgrid, its employees and the Unions covered by this Agreement (refer Sub-clause 2.1) understand that the adoption of new technology and regular review of work processes and, when identified, the removal of inefficient or redundant activities constitutes a vital element in improving Ausgrid's business objectives and are committed to seeking continuous improvement in all that we do.

12.3 Ausgrid, its employees and the Unions covered by this Agreement undertake to achieve Australia's best practice and business success through increased productivity measured in terms of safety, timely completion of work, quality and cost.

13 HOURS OF WORK

13.1 Ordinary Hours

The persons covered by this Agreement agree that it is essential that sufficient employees be scheduled on to meet the business and customer service requirements in each workplace. Therefore, the hours of work will be scheduled after taking into consideration:

13.1.1 The provision of service;

13.1.2 The work of the branch, section or team; and

13.1.3 The personal circumstances of the employees, including parental responsibilities.

The hours of work for individual employees including start and finish times will be determined by agreement only after consultation with their manager which will take into account 13.1.1, 13.1.2 and 13.1.3 above. Individual schedules will not be altered so often that would be disruptive to the work organisation and employee's home lives. If it is proposed that the ordinary hours extend beyond eight (8) hours per day or 1800 hours or on a weekend, the relevant union will be invited to participate in the consultations. In all other circumstances the union will be notified and will be involved if requested by the employees.

13.2 Maximum Hours to be Worked

Full time employees will not be required to work in excess of 72 hours in any fortnight, except as overtime.

Employees will not be required to work in excess of 12 hours a day without receiving overtime in terms of Clause 15 Overtime.

13.3 Span of Hours

The span of hours shall be 0600 hours to 1800 hours. Employees shall be available for work between these hours by mutual agreement.

The span of hours can be adjusted by mutual agreement, with the relevant union(s) and employees, to accommodate summer time arrangements, by means of a local workplace flexibility agreement.

13.4 Normal Working Week

The normal method of scheduling hours will provide for a nine day fortnight. This may be departed from where the local manager and the majority of employees affected agree and their union has been consulted. Alternative patterns of work may include patterns such as 12 hour day/six day fortnight, nine hour day/eight day fortnight, etc.

13.5 Flexibility

The scheduled start and finish times and duration of the working day can be altered on a casual basis by agreement between the employee and his/her manager to meet unforeseen changes in the workflow or to meet the personal needs of the employee. A written record of these casual arrangements must be kept by the Manager and a copy forwarded to the union.

In these cases, the total ordinary hours should not exceed 72 over two weeks. Also, in these cases, work in excess of 12 hours per day or after 1800 hours, or on a Saturday, Sunday or Agreement/Public Holiday will still attract the appropriate penalty rates.

13.6 This clause applies except in the case of flexible part-time employees or where a Local Workplace Flexibility Agreement is in place.

14 SHIFT WORK

14.1 Definitions

14.1.1 **"Shift Work"** – work which is rostered outside the normal spread of hours and which provides for two or more shifts on a day and which requires employees to rotate or alternate in working the shifts.

14.1.2 **"Shift Worker"** is an employee who works shifts. An employee does not cease to be a shift worker during a period of leave for the purposes of determining accrued leave entitlements, pursuant to Clause 26.

14.1.3 **"Afternoon Shift"** is a shift finishing between 1800 and 2400 hours.

14.1.4 **"Early Morning Shift"** is a shift commencing between 0500 and before 0630 hours.

14.1.5 **"Seven Day Shift worker"** is a shift worker who is rostered to work on each day of the week and to be clear is a shift worker for the purposes of the *Fair Work Act 2009* National Employment Standards. Seven Day Shift workers are paid the rates in Appendix 1B.

14.1.6 **"Night Shift"** is a shift finishing between 2400 and 0800 hours.

14.2 Shift Allowance

Shift workers shall be paid the extra rates in Appendix 1D, Extra Rates, Items 3, 4 and 5. Extra rates are made on a pro rata basis for rostered shifts greater than eight hours (e.g. a nine (9) hour rostered shift receives 1.125 times the extra rate, a 12 hour rostered shift receives 1.5 times the extra rate).

14.3 Shift Penalty Rates

Penalty Rates shall be paid for shift work on Saturdays, Sundays and Agreement/ Public Holidays.

Penalty rates for all time worked during an ordinary shift on:

14.3.1 Saturday – Time and one half of the shift hours,

14.3.2 Sunday – Double Time, and

14.3.3 Agreement/Public Holiday – Double Time and an ordinary day's pay.

14.4 Change of Roster

14.4.1 Shift workers should normally be given at least five (5) days' notice of a change of shift or a change of roster. Where this is not possible the employee will be paid double time for the first shift after the change.

14.4.2 Where an employee is given less than five (5) days' notice of a change of shift or roster and the change results in the employee working additional shifts, then the employee shall be allowed an equal amount of time off at a mutually agreed time. If it is not practical for the employee to be allowed time off within four (4) weeks, the employee shall be paid for the extra shifts at double time.

14.4.3 The provisions in 14.4.1 and 14.4.2 above do not apply to employees who are classified as relief shift workers.

14.5 Day workers who are required to work shifts

14.5.1 Day workers may be required to work shifts.

14.5.2 Day workers who are required to work shifts shall be paid not less than an additional 30 per cent for the first ten (10) afternoon and/or night shifts in lieu of the shift allowance. The shift allowance is still payable where the shifts occur on a Saturday, Sunday or Agreement/Public Holiday.

14.5.3 After working ten (10) consecutively rostered afternoon and/or night shifts, unbroken by a return to normal day work, an employee shall be deemed to be a shift worker.

14.5.4 The additional payments in Sub-clause 14.5.2 do not apply where a day worker is appointed to shift work at the employee's own request, or as a result of having applied for and obtained a permanent position involving shift work.

14.6 "**Continuous Afternoon or Night Work**" is work that is performed continuously in the afternoon or night. A person working continuous afternoon or night work is not considered to be a shift worker as defined above at 14.1.2.

14.6.1 A day worker who is required to commence working continuous afternoon or night work shall be paid for the first five (5) shifts at time and a half or at the rate otherwise provided in this Agreement, whichever is the greater. These shifts may be organised so that an employee receives at least a full week's pay.

14.6.2 After working five (5) consecutively rostered continuous afternoon or night shifts, unbroken by a return to normal day work, the employee is deemed to be a continuous afternoon or night worker.

14.6.3 An employee engaged on continuous afternoon work or continuous night work as defined in this Agreement, who works on:

14.6.3.1 any day other than an Agreement/Public Holiday shall be paid ordinary rates plus 30% for all time worked;

14.6.3.2 an Agreement/Public Holiday shall be paid ordinary rates plus 30% for all time worked in addition to an ordinary day's pay.

14.6.4 The additional payments in Sub-clause 14.6.1 do not apply where a day worker is appointed to shift work at the employee's own request, or as a result of having applied for and obtained a permanent position involving shift work.

14.7 This clause applies except where a Local Workplace Flexibility Agreement is in place.

15 OVERTIME

15.1 Reasonable Overtime

Subject to Sub-clause 15.1.1, Ausgrid may require an employee to work reasonable overtime at overtime rates.

15.1.1 An employee may refuse to work overtime in circumstances where the working of such overtime would result in the employee working hours which are unreasonable having regard to:

15.1.1.1 any risk to the employees' health and safety

15.1.1.2 the employee's personal circumstances including any family responsibilities

15.1.1.3 the needs of the workplace

15.1.1.4 the notice (if any) given by Ausgrid of the overtime and by the employee of his or her intention to refuse it, and

15.1.1.5 any other relevant matter.

15.2 Overtime Hours

15.2.1 All time worked in excess of the scheduled ordinary hours shall be overtime unless the employee and the manager have altered them by agreement on a casual basis in accordance with Sub-clause 13.1 Hours of Work.

15.2.2 All time worked outside the period 0600 – 1800 hours Monday to Friday shall be overtime unless the majority of employees and their manager have entered into a Local Workplace Flexibility Agreement which complies with Clause 24 Local Workplace Flexibility.

15.3 Overtime rates

15.3.1 All overtime which commences between midnight Sunday and midday Saturday shall be paid at time and a half for the first two (2) hours and double time thereafter.

15.3.2 All overtime which commences between midday Saturday and midnight Sunday shall be paid at double time.

15.3.3 All overtime which commences on an Agreement/Public Holiday is paid at double time and a half until the employee finishes.

15.3.4 In the case of day workers, all work done on an Agreement/Public Holiday during the time which would have been the employee's normal working time is paid at triple time.

15.3.5 All overtime worked by shift workers on a day on which they are rostered off shall be paid at double time until released from duty. Shift workers are not entitled to overtime as a result of changed shifts which they organise amongst themselves.

15.4 No payment will be made for unauthorised overtime.

15.5 Rest period after Overtime

15.5.1 Where overtime is necessary, whenever possible it shall be organised so that employees shall have at least ten (10) consecutive hours off duty. If so much overtime is worked that an employee cannot take a ten (10) consecutive hour break before the normal commencement time, they shall be entitled to time off without loss of normal pay until they have had a ten (10) consecutive hour break. If a ten (10) hour break is not given then the employee is paid double time for all hours worked until a ten (10) consecutive hour break is taken.

15.5.2 If a day worker is recalled to work overtime between the time determined by extending the employee's usual ceasing time on the previous day by eight (8) hours and 0400 hours, the employee's normal starting time the next day shall be put back by the number of hours worked between those times or paid at double time for the number of hours worked between those times.

15.5.3 If an employee is required to resume duty after being recalled to work overtime which exceeds four (4) hours, whether continuous or not, before having an ten (10) hour break, the employee shall be paid double time for all hours worked until a break of ten (10) consecutive hours has been taken.

15.6 Recall to work Overtime

15.6.1 Except where overtime is continuous (subject to a reasonable meal break) with the usual commencing or ceasing times of either a day worker's ordinary working hours or a shift worker's ordinary rostered shift on a day upon which the employee has been rostered on, "Recalled to work overtime" means:

15.6.2 a direction given to an employee to commence overtime work at a specified time which is two (2) hours or more prior to either the employee's usual or rostered commencing time, or one (1) hour or more after the employee's usual or rostered ceasing time (whether notified before or after leaving the employee's place of work); or

15.6.3 a notification given to an employee after completion of the employee's day's work directing the employee to take up overtime work; or,

15.6.4 a notification given to an employee whose normal hours do not include work on a Saturday, Sunday or Agreement holiday to work on any such day; or

15.6.5 a notification given to a shift worker to work on a rostered day off.

15.7 An employee, who is recalled to work overtime and is not On Call, as provided in Clause 16 On Call, shall be paid for a minimum of four (4) hours at the appropriate overtime rate.

15.7.1 The payment for an employee who is recalled to work overtime commences from the time the employee receives the call and continues until the employee arrives home.

15.7.2 Except in the case of unforeseen circumstances arising, the employee shall not be required to work the full four (4) hours if the job to which the employee was recalled, or which the employee was required to perform, is completed within a shorter period.

15.8 This clause applies except where a Local Workplace Flexibility Agreement is in place.

16 ON CALL

16.1 An employee who is on call shall be paid the amount in Appendix 1D, Extra Rates, Item No.'s 6, 7 and 8.

16.2 An employee who is on call for less than a whole week shall be paid one fifth (1/5th) of the allowance for each working day (Monday – Friday) or part thereof and one quarter (1/4) of the allowance for each Saturday, Sunday or Agreement/Public Holiday or part thereof up to a maximum of the full allowance.

16.3 An employee who is on call is required to be available for emergency and/or breakdown work at all times outside the employee's usual hours of duty. Upon receiving a call for duty, the employee is to proceed directly to the job.

16.3.1 Emergency and/or breakdown work includes restoring supply to our customers or making equipment safe which has failed or is likely to fail or maintenance work which is essential to prevent a supply failure. This includes work not only on Ausgrid's equipment but also on our customers' equipment.

16.4 Payment for a call out shall commence from the time the employee receives a call and continues until the employee arrives back home. Payment is at the appropriate overtime rate as detailed in Sub-clause 16.6.

16.4.1 Employees who are on call are not confined to their homes but they must be reasonably available so that they would not be delayed by more than 15 minutes in addition to the time it would normally take to travel from their homes to the place where the work is to be performed. Any delays in excess of 15 minutes will not be paid unless specifically authorised.

16.5 An employee may be required to attend any other calls which arise prior to returning home.

16.6 Call outs are paid at double time with a minimum one (1) hour payment. Call outs during an Agreement/Public Holiday are paid at double time and a half with a minimum one (1) hour payment.

16.7 Employees who are called out are entitled to a minimum of one (1) hour's pay at double time each time they are called out.

16.8 If a day worker is recalled to work overtime between the time determined by extending the employee's usual ceasing time on the previous day by eight (8) hours and 0400 hours, the employee's normal starting time the next day shall be put back by the number of hours worked between those times or paid at double time for the number of hours worked between those times.

16.9 If an employee is required to resume duty after a call out which exceeds four (4) hours, whether continuous or not, before having a ten (10) hour break, the employee shall be paid double time for all hours worked until a break of ten (10) consecutive hours has been taken.

16.10 Normal meal break and meal allowance provisions apply to overtime worked on call outs.

16.11 This clause applies except where a Local Workplace Flexibility Agreement is in place.

17 STANDING BY

17.1 This clause applies to employees who are directed to stand by in readiness to work overtime. It does not apply to employees who are on call.

17.2 Employees who are standing by shall be paid at ordinary rates from the time the employee commences standing by until the time the employee is directed to commence overtime or to cease standing by.

17.3 This clause applies except where a Local Workplace Flexibility Agreement is in place.

18 MEAL BREAK / MEAL ALLOWANCE

18.1 Meal breaks during ordinary hours shall be of at least a half hour duration. The actual duration and timing of the break shall be set after considering the location and nature of the work and may be altered from time to time in consultation with the employees concerned.

18.2 If an employee is required to work longer than five (5) ordinary hours without a meal or work break, they shall be paid time and a half until a meal break is taken.

18.3 Meal Breaks and Meal Allowances are subject to the following conditions:

18.3.1 For all overtime which commences immediately after an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes and a meal allowance after the first hour and a half actually worked. The second meal break and second meal allowance become an entitlement after a total of four (4) hours actually worked. Every subsequent period of four (4) hours actually worked shall entitle the employee to another meal break and meal allowance.

18.3.2 For all overtime which commences immediately before an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes after each period of four (4) hours actually worked. The employee shall be entitled to a meal allowance after the first two (2) hours actually worked. Another meal allowance shall become an entitlement after a total of eight (8) hours are actually worked. Every subsequent period of four (4) hours actually worked shall entitle the employee to another meal allowance.

18.3.3 For all overtime which is not continuous with an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes and a meal allowance after each period of four (4) hours actually worked.

18.4 An employee may, by mutual agreement, extend a meal break on overtime up to a total period of one (1) hour provided that any time in excess of 20 minutes is unpaid.

18.5 Meal breaks which occur during periods of overtime should be taken at the time they fall due unless the employee seeks to defer the break to a later time.

18.6 This clause applies except where a Local Workplace Flexibility Agreement is in place.

19 PART-TIME EMPLOYMENT

19.1 A part-time employee shall be paid a pro rata rate commensurate with their normal hours worked each week.

19.2 A part-time employee shall be entitled to all service entitlements on a pro rata basis commensurate with their normal hours worked each week. Appropriate training will also be provided.

19.3 The persons covered by this Agreement will consult before introducing a new area of part-time employment.

20 CASUAL EMPLOYMENT

20.1 Casual Employees shall be paid a loading of 20 per cent which shall be in lieu of all entitlements provided under this Agreement including sick leave and annual leave other than those prescribed below:

20.1.1 Long Service Leave in accordance with the Long Service Leave Act.

20.1.2 Time and half plus the 20 per cent loading for all hours worked in excess of eight (8) hours per day or 72 hours per fortnight or outside the spread of hours or on a Saturday before midday.

20.1.3 Double time plus 20 per cent for all hours worked after midday on a Saturday or on a Sunday or an Agreement/Public Holiday.

20.1.4 Casual employees shall be eligible for meal allowances and meal breaks as provided in Clause 18 Meal Break/Meal Allowance of this Agreement.

20.2 Provided that casual employment will not be introduced into any new area of Ausgrid's operations without prior consultation with the relevant union or unions.

20.3 The objective of this clause is for Ausgrid to take all reasonable steps to provide its employees with secure employment by maximising the number of permanent positions in Ausgrid's workforce, in particular by ensuring that casual employees have an opportunity to elect to become full time or part-time employees.

20.3.1 A casual employee engaged by Ausgrid on a regular and systematic basis for a sequence of periods of employment under this Agreement during a calendar period of six (6) months shall thereafter have the right to elect to have their ongoing contract of employment converted to permanent full time employment or part-time employment if the employment is to continue beyond the conversion process prescribed by this sub-clause.

20.3.2 Ausgrid shall give such an employee notice in writing of the provisions of this sub-clause within four (4) weeks of the employee having attained such period of six (6) months. However, the employee retains their right of election under this sub-clause if Ausgrid fails to comply with this notice requirement.

20.3.3 Any casual employee who has a right to elect under Sub-clause 20.3.1, upon receiving notice under Sub-clause 20.3.2 or after the expiry of the time for giving such notice, may give four (4) weeks' notice in writing to Ausgrid that they seek to elect to convert their ongoing contract of employment to full time or part-time employment, and within four (4) weeks of receiving such notice from the employee, Ausgrid shall consent to or refuse the election, but shall not unreasonably so refuse. Where Ausgrid refuses an election to convert, the reasons for doing so shall be fully stated and discussed with the employee concerned, and a genuine attempt shall be made to reach agreement. Any dispute about a refusal of an election to convert an ongoing contract of employment shall be dealt with as far as practicable and with expedition through the Dispute Settlement Procedure contained in Clause 4.

20.3.4 Any casual employee who does not, within four (4) weeks of receiving written notice from Ausgrid, elect to convert their ongoing contract of employment to full time employment or part-time employment will be deemed to have elected against any such conversion.

20.3.5 Once a casual employee has elected to become and been converted to a full time employee or a part-time employee, the employee may only revert to casual employment by written agreement with Ausgrid.

20.3.6 If a casual employee has elected to have their contract of employment converted to full time or part-time employment in accordance with Sub-clause 20.3.3, Ausgrid and the employee shall, in accordance with this paragraph, and subject to Sub-clause 20.3.3 discuss and agree upon:

20.3.6.1 whether the employee will convert to full time or part-time employee, and

20.3.6.2 if it is agreed that the employee will become a part-time employee, the number of hours and the pattern of hours that will be worked will be consistent with any other part-time employment provisions of this Agreement .

Provided that an employee who has worked on a full time basis throughout the period of casual employment has the right to elect to convert their contract of employment to full time employment and an employee who has worked on a part-time basis during the period of casual employment has the right to elect to convert their contract of employment to part-time employment, on the basis of the same number of hours and times of work as previously worked, unless other arrangements are agreed between Ausgrid and the employee.

20.3.7 Following an agreement being reached pursuant to Sub-clause 20.3.6, the employee shall convert to full time or part-time employment. If there is any dispute about the arrangements to apply to an employee converting from casual employment to full time or part-time employment, it shall be dealt with as far as practicable and with expedition through the Dispute Settlement Procedure contained in Clause 4.

20.3.8 An employee must not be engaged and re-engaged, dismissed or replaced in order to avoid any obligation under this Sub-clause.

20.3.9 Disputes regarding the application of this Sub-clause

20.3.9.1 Where a dispute arises as to the application or implementation of Sub-clause 20.3, the matter shall be dealt with pursuant to the Dispute Settlement Procedure contained in Clause 4.

21 LABOR HIRE/AGENCY HIRE WORKERS

21.1 Persons covered by this agreement recognise the need for Ausgrid to engage labour hire workers from time to time to meet short term business needs. Ausgrid will consult with the relevant persons in relation to the prospective need for labour hire engagement. In this context, the persons covered by this Agreement recognise short term as a maximum of six months except in circumstances where consultation has taken place prior to any extension of this time frame.

21.2 The persons covered by this Agreement will consult before introducing a new area of labour hire

22 FIXED TERM EMPLOYMENT

22.1 Fixed term employees shall be paid and be entitled to all the conditions under this Agreement which are appropriate.

22.2 A fixed term employee does not include a casual employee.

22.3 Fixed term appointments may be made for a period of up to 12 months. At the expiration of that period work requirements will be reviewed by the parties.

22.4 Fixed term employment shall not be used as an alternative to full time employment.

22.5 The persons covered by this Agreement will consult before introducing a new area of fixed term employment

23 JOB-SHARING

23.1 Job-sharing is a particular type of work where one or more full time positions are shared by two or more employees to cover an agreed span of hours.

23.2 Where a full time employee requests to convert to part-time work and their current position needs someone on duty full time, a job-sharing arrangement may be suitable.

23.3 A job-sharer shall be paid a pro rata rate commensurate with their normal hours worked each week.

23.4 A job-sharer shall be entitled to all service entitlements on a pro rata basis commensurate with their normal hours worked each week. Appropriate training will also be provided.

23.5 In the event that one of the employees sharing a job either resigns or is appointed to another position, the remaining employee will be offered the opportunity to be appointed to the position on a full time basis.

23.6 A breakdown in an existing job-share arrangement will not be used as an opportunity to change the full time status of that position without full consultation with the appropriate union(s) partner(s).

24 LOCAL WORKPLACE FLEXIBILITY

24.1 This clause is intended to provide the means by which the effect of conditions in this Agreement may be varied as a result of an arrangement which is mutually agreed at the local workplace.

24.2 This clause is intended to apply to classifications or work groups of employees, not individuals.

24.3 A Local Workplace Flexibility Agreement may vary the effect of conditions of employment that are provided in the following clauses:

Clause 13 Hours of Work (Span of Hours)

Clause 14 Shift Work
Clause 15 Overtime
Clause 16 On Call
Clause 17 Standing By
Clause 18 Meal Break
Clause 41 Excess Travel

24.4 A Local Workplace Flexibility Agreement may only be created where the following requirements have been complied with:

24.4.1 The employees are not disadvantaged when the local workplace agreement is viewed as a whole.

24.4.2 The majority of employees affected agree after taking all views into consideration including the need to maintain effective working relationships.

24.4.3 The appropriate union has been advised prior to the commencement of discussions with the employees concerned.

24.4.4 The Local Workplace Flexibility Agreement is not contrary to any law and does not jeopardise safety.

24.4.5 The Local Workplace Flexibility Agreement will improve efficiency and/or customer service and/or job satisfaction.

24.4.6 Local Workplace Flexibility Agreements shall be recorded in writing and signed by the manager of the Ausgrid business unit and the relevant union, and a representative of Unions NSW. Where more than one (1) union has coverage of the position affected by the Local Workplace Flexibility Agreement then the unions with coverage and Unions NSW will be signatories to the Agreement.

24.4.7 Managers shall give fair consideration to requests from staff for flexible work arrangements and ensure that work arrangements do not discriminate or work against particular employees.

24.5 Individual employees may opt out of a local workplace agreement if its operation will cause him/her genuine personal or family hardship and they can do so without disrupting the pattern of work or inconvenience customers. Transfer to another equivalent position will be considered in these circumstances.

25 INDIVIDUAL FLEXIBILITY TERM

25.1 An employer and employee covered by this enterprise agreement may agree to make an individual flexibility arrangement to vary the effect of terms of the agreement if:

25.2 The agreement deals with one or more of the following matters:

25.2.1 taking accumulated RDOs;

25.2.2 Salary Sacrifice

25.3 The arrangement meets the genuine needs of the employer and employee in relation to one or more of the matters mentioned in this clause; and the arrangement is genuinely agreed to by the employer and employee.

25.4 The employer must ensure that the terms of the individual flexibility arrangement:

25.4.1 are about permitted matters under section 172 of the Fair Work Act 2009; and

25.4.2 are not unlawful terms under section 194 of the Fair Work Act 2009; and result in the employee being better off overall than the employee would be if no arrangement was made.

25.5 The employer must ensure that the individual flexibility arrangement:

25.5.1 is in writing; and

25.5.2 includes the name of the employer and employee; and

25.5.3 is signed by the employer and employee and if the employee is under 18 years of age, signed by a parent or guardian of the employee; and

25.5.4 includes details of:

25.5.4.1 the terms of the enterprise agreement that will be varied by the arrangement; and

25.5.4.2 how the arrangement will vary the effect of the terms; and

25.5.4.3 how the employee will be better off overall in relation to the terms and conditions of his or her employment as a result of the arrangement; and

25.5.5 states the day on which the arrangement commences.

25.6 The employer must give the employee a copy of the individual flexibility arrangement within 14 days after it is agreed to.

25.7 The employer or employee may terminate the individual flexibility arrangement:

25.7.1 by giving no more than 28 days written notice to the other party to the arrangement; or

25.7.2 if the employer and employee agree in writing at any time.

26 ANNUAL LEAVE

26.1 Employees, excluding shift workers, shall accumulate 144 hours of annual leave in each complete year of service.

26.2 This leave will be approved by Ausgrid provided that adequate employees are available to meet the needs of the organisation.

26.3 Annual leave may be taken in any combination of separate periods. These should be taken in whole days.

26.4 Payment for annual leave shall be at the ordinary rate of pay. See Clause 44 Higher Grade Pay in relation to Higher Grade Pay.

26.5 Employees may be allowed to take a period of annual leave in advance of its accrual, subject to approval. Where their employment subsequently terminates before the leave has accrued on a pro rata basis, Ausgrid may deduct any pre-payment from their termination pay.

26.6 Any Agreement/Public Holidays which occur during annual leave shall not be deducted from annual leave entitlements.

26.7 Rostered days off do not accrue during periods of annual leave.

26.8 Seven Day Shift workers shall accumulate 200 hours of annual leave in each complete year of service. Other shift workers shall accumulate 160 hours of annual leave in each complete year of service.

26.9 Employees who have worked as Seven Day Shift workers for part of a year shall receive a pro rata entitlement to additional annual leave.

26.10 When an employee ceases employment for any reason, they shall be paid for any annual leave which has not yet been taken for each completed year of service. The employee shall also be paid a pro rata amount for any leave which has not been taken for any partly completed year of service. Payment for all outstanding annual leave shall be at the ordinary rate which applied at the time employment ceased. (See Clause 44 in relation to Higher Grade Pay).

26.11 Employees shall not commence annual leave whilst on sick leave or accident leave.

26.12 All annual leave is paid at the employee's ordinary rate of pay which includes, all purpose allowances as defined and Higher Grade Pay where applicable (See Clause 44 Higher Grade Pay). Shift workers are paid for their annual leave at their ordinary rate inclusive of shift allowances or receive an annualised holiday loading paid at 1.65% each week, whichever is the greater.

26.13 Employees may use single days of annual leave to look after sick relatives or deal with emergencies. In these circumstances, the employee should provide his/her manager with as much notice as possible before the scheduled start of work.

26.14 Where an employee has an annual leave balance in excess of 40 days for a day worker or 50 days for a shift worker, the employee and manager will develop a plan to reduce the annual leave balance to less than 40 or 50 days respectively.

26.15 Annual leave maybe taken at half pay.

27 SICK LEAVE

27.1 Employees are entitled to access paid sick leave when their personal illness or injury prevents them from attending their workplace.

27.2 Visits to a doctor or dentist during the employee's normal working hours and any other part day absences will be debited against the employee's sick leave entitlements.

27.3 Sick leave will not be paid where the absence arises from participation in any activity where the employee is paid by other than Ausgrid.

27.4 In determining an employee's total sick leave credit, service with an organisation which has merged with Ausgrid will be taken into account.

27.5 Where an employee has exhausted their entitlement to paid sick leave, additional leave with pay may be granted if the circumstances warrant it.

27.6 Where an employee has exhausted their entitlement to paid sick leave, and is granted leave without pay, that period may or may not count as service as determined by Ausgrid.

27.7 After three months an employee is entitled to 24 hours sick leave.
After a total of six months an employee is entitled to an additional 32 hours.
After a total of 12 months an employee is entitled to an additional 64 hours.

After a total of 18 months an employee is entitled to an additional 48 hours.
After a total of 24 months an employee is entitled to an additional 72 hours.
After a total of 36 months an employee is entitled to an additional 120 hours
After a total of 48 months an employee is entitled to an additional 120 hours.
After a total of 60 months an employee is entitled to an additional 144 hours.
After every 12 months thereafter an employee is entitled to an additional 144 hours.
Any untaken portion of the entitlement shall accumulate for use in future years.

27.8 An employee who is diagnosed as being so sick that they are not expected to ever be fit for normal duties shall be "Retired-Ill Health". The date of retirement will normally be the date that their sick leave entitlements are exhausted. However, the employee will have the option to take a lump sum payment for sick leave in accordance with Clause 40 Cashing in Sick Leave and retire after any sick leave which accrued after 15 February 1993 has been exhausted. No additional sick leave entitlements will accrue from the date the diagnosis is made.

27.9 If an employee provides medical evidence that they were injured or sick whilst on annual leave or long service leave to such an extent that they were unable to derive benefit from the leave, then the period of leave which is affected will be re-credited provided it is at least of five (5) consecutive working days duration.

27.10 Agreement/Public Holidays and RDOs which occur during periods of sick leave are not counted as sick leave.

27.11 Subject to Sub-clause 27.12 below, a certificate from a medical practitioner is required for all claims for sick pay which exceed two (2) working days. However, where the relevant manager considers an employee's sick leave record to be unsatisfactory, the employee may be required to produce a medical certificate to cover all absences for the next 12 months.

27.12 Claims for sick leave and/or pay not covered by a medical certificate shall not be made more frequently in any year of service than:

- in the case of employees with less than one (1) years service, a medical certificate is required for all occasions where a claim for paid sick leave is made;
- in the case of employees with one (1) year but less than five (5) years service – four (4) occasions in a service year.
- In the case of employees with five (5) years or more service – seven (7) occasions in a service year.

27.13 Paid sick leave will not be available for absences on either the last working day before, or the first working day after, an Agreement/Public Holiday provided for in Clause 36, annual leave or long service leave, unless a medical certificate is provided.

27.14 A medical certificate should include the following information:

- Name of employee
- Name of doctor and signature
- Reason for absence *
- Period during which the employee is unfit for work, and
- Date of issue.

*While it is reasonable for Ausgrid to ask the reason for an absence, the employee and treating doctor can decide how much detail is provided.

27.15 Where an employee is required to obtain a medical certificate it should be obtained during the period of absence on sick leave and not be obtained retrospectively. This requirement may be waived in extenuating circumstances.

27.16 Part day absences shall be debited against the employee's sick leave entitlement.

27.17 Employees will make reasonable efforts to notify their supervisor as close to the normal start time as practical if they are going to be absent on sick leave.

27.18 If there is any dispute about a doctor's diagnosis in relation to sick leave, a second opinion may be obtained from another doctor jointly selected by the persons covered by this Agreement. This second opinion will be deemed to settle the dispute. Any cost for obtaining the second opinion will be paid by the person that the decision goes against.

28 LONG SERVICE LEAVE

28.1 Long Service Leave shall accrue according to the following scale:

After ten years service	13 weeks
After 15 years service	Additional 8½ weeks
After 20 years service	Additional 13½ weeks
After each additional five years service	Additional 13 weeks

28.2 All long service leave is paid at the employee's ordinary rate of pay as defined.

28.3 An employee who has completed five years service and less than ten years service with Ausgrid and whose employment terminates for any reason other than misconduct, shall be entitled to payment of 1.3 week's pay for each year of service and pro rata for partly completed years to the nearest day.

28.4 An employee who has completed ten or more years service with Ausgrid whose employment terminates for any reason other than misconduct, shall be entitled to the following pro rata long service leave, minus any periods of long service leave already taken:

Ten years service	13 weeks
Between 10 and 15 years service	1.7 weeks per year
Between 15 and 20 years service	2.7 weeks per year
After 20 years service	2.6 weeks per year

Pro rata amounts will be paid for partly completed years to the nearest day.

28.5 Employees who have continuity of service with an organisation which merged with Ausgrid or whose service with a previous employing organisation is recognised by Ausgrid for long service leave purposes, will have that service and any periods of long service leave taken into consideration in calculating their entitlement in terms of Clause 39, Calculation of Service.

28.6 Employees shall not commence long service leave whilst on sick or accident leave.

28.7 Employees shall give at least four weeks notice of their intention to take long service leave. Shorter notice may be agreed, subject to work requirements.

28.8 Long service leave may be taken at half pay. All long service leave will be taken in amounts no less than one day.

29 ACCIDENT LEAVE AND PAY

29.1 "**Accident Pay**" means an amount of pay equal to the difference between the amount of workers' compensation received and the ordinary rate of pay.

29.2 Where an employee has been injured in the course of employment at Ausgrid, they shall be paid Accident Pay and Workers' Compensation for a combined total period up to 52 weeks, provided that employment continues with Ausgrid.

29.3 Additional periods of accident pay may be granted by Ausgrid where circumstances warrant it.

29.4 A certificate from a medical practitioner is required for all claims for accident pay. If there is any dispute between doctors, the persons covered by this Agreement will select a third doctor whose opinion will settle the matter of accident pay.

This will not determine the issue of liability which will be settled by the Workers' Compensation Commission if the persons covered by this Agreement cannot agree.

29.5 A medical certificate should include the following information:

- Name of employee
- Name of doctor and signature
- Reason for absence
- Period during which the employee is unfit for work and
- Date of issue.

29.6 If an employee receives a settlement or compensation in relation to an injury or illness which has resulted in a claim on Ausgrid for paid sick leave or paid accident leave, then the employee shall repay Ausgrid the sum of the actual pay received to a maximum not exceeding the settlement or compensation received. In such cases, the amount of sick leave which was reimbursed will be re-credited to the employee.

30 SPECIAL LEAVE

30.1 Special Leave may be granted for the following purposes:

30.1.1 Blood donations,
30.1.2 Attending to union matters, including training and official conferences
30.1.3 Attending Employee Assistance Program
30.1.4 Personal.

30.2 Special Leave may be granted with or without pay by agreement.

30.3 Special Leave may or may not count for service by agreement.

30.4 An employee who is required to attend for Jury Service will be granted leave which will count as service. An employee will be paid the difference between their normal rate of pay and the amount paid for Jury Service.

30.5 Special Leave with pay will be granted to employees for their first appointment under the Employee Assistance Program. Subsequent appointments are subject to Sub-clauses 30.2 and 30.3 above.

30.6 Employees are encouraged to use RDOs or single days of annual leave to cover other absences. The employee should provide his/her manager with as much notice as possible before the scheduled start of work.

30.7 An employee who is required to attend military training will have such periods counted as part of service, up to a maximum of 14 days per year. The employee will be paid the difference between the ordinary rate currently paid and amount paid for military training, on production of evidence of the employee's attendance and money paid to the employee.

31 COMPASSIONATE LEAVE

31.1 An employee, is entitled to 2 days of compassionate leave for each occasion (a permissible occasion) when a member of the employee's immediate family (as defined in clause 32.3), or a member of the employee's household:

31.1.1 contracts or develops a personal illness that poses a serious threat to his or her life; or

31.1.2 sustains a personal injury that poses a serious threat to his or her life; or

31.1.3 dies.

31.2 Compassionate leave for permanent employees is with out loss of pay for ordinary hours occurring during the period of the compassionate leave

31.3 Compassionate leave for casual employees is unpaid

31.4 An employee may take compassionate leave for a particular permissible occasion if the leave is taken:

31.4.1 to spend time with the member of the employee's immediate family or household who has contracted or developed the personal illness, or sustained the personal injury, referred to in clause 32.3; or

31.4.2 after the death of the member of the employee's immediate family or household referred to in clause 32.3.

31.5 An employee may take compassionate leave for a particular permissible occasion as:

31.5.1 a single continuous 2 day period; or

31.5.2 2 separate periods of 1 day each; or

31.5.3 any separate periods to which the employee and his or her employer agree.

31.5.4 If the permissible occasion is the contraction or development of a personal illness, or the sustaining of a personal injury, the employee may take the compassionate leave for that occasion at any time while the illness or injury persists.

31.6 Ausgrid must not fail to re-engage a casual employee because the employee accessed the entitlement provided for in this clause. The rights of Ausgrid to engage or not engage a casual employee are not otherwise affected.

32 CARER'S LEAVE

32.1 An employee, other than a casual employee, with responsibilities in relation to a class of person set out in sub-paragraph 32.3, who needs the employee's care and support, shall be entitled to use, in accordance with this sub-clause, any current or accrued sick leave entitlement, provided for in Clause 27 Sick Leave, for absences to

provide care and support, for such persons when they are ill or who require care due to an unexpected emergency. Such leave may be taken for part of one day.

Note: In the unlikely event that more than ten (10) days sick leave in any year is to be used for caring purposes the employer and employee shall discuss appropriate arrangements which, as far as practicable, take account of the employer's and employee's requirements.

Where the persons covered by this Agreement are unable to reach agreement the disputes procedure at Clause 4 should be followed.

32.2 The employee shall, if required,

32.2.1 establish either by production of a medical certificate or statutory declaration, the illness of the person concerned and that the illness is such as to require care by another person, or

32.2.2 establish by production of documentation acceptable to the employer or a statutory declaration, the nature of the emergency and that such emergency resulted in the person concerned requiring care by the employee.

In normal circumstances, an employee must not take carer's leave under this sub-clause where another person had taken leave to care for the same person.

32.3 The entitlement to use sick leave in accordance with this clause is subject to:

32.3.1 the leave being taken to provide care or support to a member of the employee's immediate family, or a member of the employee's household, who requires care and support because of:

32.3.1.1 a personal illness, or personal injury affecting the member, or

32.3.1.2 an unexpected emergency affecting the member.

32.4 An employee shall, wherever practicable, give the employer reasonable notice prior to the intention to take leave; the reasons for taking such leave and the estimated length of absence. If it is not practicable for the employee to give prior notice of absence, the employee shall notify the employer by telephone of such absence at the first opportunity on the day of absence.

32.5 An employee may elect, with the consent of the employer, to take unpaid leave for the purpose of providing care and support to a class of person set out in Sub-clause 32.3 above who is ill or who requires care due to an unexpected emergency.

32.6 An employee may elect with the consent of the employer, to take annual leave not exceeding ten (10) days in single-day periods, or part thereof, in any calendar year at a time or times agreed by the employer and employee, for the purposes of providing care to a class of person set out in Sub-clause 32.3.

32.6.1 An employee may elect with the employer's agreement to take annual leave at any time within a period of 24 months from the date at which it falls due.

32.7 An employee may elect, with the consent of the employer, to take time off in lieu of payment for overtime at a time or times agreed with the employer within twelve (12) months of the said election.

32.8 Overtime taken as time off during ordinary time hours shall be taken at the ordinary time rate, which is an hour for each hour worked.

32.9 If, having elected to take time as leave, in accordance with Sub-clause 32.7, the leave is not taken for whatever reason, payment for time accrued at overtime rates shall be made at the expiry of the twelve (12) month period or on termination.

32.10 Where no election is made in accordance with the said Sub-clause 32.7, the employee shall be paid overtime rates in accordance with the Agreement.

32.11 An employee may elect, with the consent of Ausgrid, to work 'make-up-time' under which the employee takes time off ordinary hours and works those hours at a later time, during the spread of ordinary hours provided in the Agreement, at the ordinary rate of pay.

32.12 An employee on shift work may elect, with the consent of the employer, work 'make-up-time' (under which the employee takes time off ordinary hours and works those hours at a later time) at the shift work rate which would have been applicable to the hours taken off.

32.13 An employee may elect, with the consent of the employer, to take a RDO at any time.

32.14 An employee may elect, with the consent of the employer, to take RDOs in part day amounts.

32.15 An employee may elect, with the consent of the employer, to accrue some or all RDOs for the purpose of creating a bank to be drawn upon at a time mutually agreed between the employer and employee, or subject to reasonable notice by the employee or the employer.

32.16 This sub-clause is subject to the employer informing each union which is both party to the Agreement and which has members employed at the particular enterprise of its intention to introduce an enterprise system of RDO flexibility, and providing a reasonable opportunity for the union(s) to participate in negotiations.

32.17 Personal Carer's Entitlement for casual employees

32.17.1 Subject to the evidentiary and notice requirements in Sub-clauses 32.2 and 32.4, casual employees are entitled to not be available to attend work, or to leave work if they need to care for a person prescribed in Sub-clause 32.3 of this clause who are sick and require care and support, or who require care due to an unexpected emergency, or the birth of a child.

32.17.2 The employer and the employee shall agree on the period for which the employee will be entitled to not be available to attend work. In the absence of agreement, the employee is entitled to not be available to attend work for up to 48 hours (i.e. two (2) days) per occasion. The casual employee is not entitled to any payment for the period of non-attendance.

32.17.3 An employer must not fail to re-engage a casual employee because the employee accessed the entitlements provided for in this clause. The rights of an employer to engage or not to engage a casual employee are otherwise not affected.

33 PARENTAL LEAVE

33.1 The following provisions shall also apply in addition to those set out in Chapter 2, Part 2-2, Division 5 – 'Parental leave and related entitlements' of the National Employment Standard (NES) under the *Fair Work Act 2009* (Cth); and the *Paid Parental Leave Act 2010* (Cth). The provisions within this clause shall also operate

in conjunction with the relevant policies and procedures adopted by Ausgrid from time to time.

33.2 Parental Leave

33.2.1 Employees who are eligible for Parental leave without pay shall be entitled to receive up to 14 weeks of paid leave (or 28 weeks at half pay) included in the 12 months approved at their ordinary rate of remuneration to assist the employee's ability to reconcile work and family responsibilities and to return to work within the maximum timeframe, if consented, as determined at Sub-clause 33.3.

33.2.2 An employer must not fail to re-engage a regular casual employee because the:

33.2.2.1 employee or employee's spouse is pregnant

33.2.2.2 employee is or has been immediately absent on parental leave

33.2.2.3 rights of an employer in relation to engagement and re-engagement of casual employees are not affected, other than in accordance with this clause.

33.3 Right to request

33.3.1 An employee entitled to parental leave may request the employer to allow the employee to:

33.3.1.1 extend the period of simultaneous unpaid parental leave use up to a maximum of eight (8) weeks

33.3.1.2 extend the period of unpaid parental leave for a further continuous period of leave not exceeding 12 months

33.3.1.3 return from a period of parental leave on a part-time basis until the child reaches school age

33.3.1.4 assistance in reconciling work and parental responsibilities.

33.3.2 The employer shall consider the request having regard to the employee's circumstances and, provided the request is genuinely based on the employee's parental responsibilities, may only refuse the request on reasonable grounds related to the effect on the workplace or the employer's business. Such grounds might include cost, lack of adequate replacement staff, loss of efficiency and the impact on customer service.

33.4 Employee's request and the employer's decision to be in writing

The employee's request and the employer's decision made under Sub-clauses 33.3.2 must be recorded in writing.

33.4.1 Request to return to work part-time

Where an employee wishes to make a request under Sub-clause 33.3.1.3 such a request must be made as soon as possible but no less than seven (7) weeks prior to the date upon which the employee is due to return to work from parental leave.

33.5 Other Parent Leave

33.5.1 Employees covered by this Agreement who wish to access concurrent Parental Leave, shall be entitled to one weeks paid parental leave on successful application, in accordance with Ausgrid's Parental Leave Policy.

33.6 Communication during all forms of parental leave

33.6.1 Where an employee is on parental leave and a definite decision has been made to introduce significant change at the workplace, the employer shall take reasonable steps to:

33.6.1.1 make information available in relation to any significant effect the change will have on the status or responsibility level of the position the employee held before commencing parental leave, and

33.6.1.2 provide an opportunity for the employee to discuss any significant effect the change will have on the status or responsibility level of the position the employee held before commencing parental leave.

33.6.2 The employee shall take reasonable steps to inform the employer about any significant matter that will affect the employee's decision regarding the duration of parental leave to be taken, whether the employee intends to return to work and whether the employee intends to request to return to work on a part-time basis.

33.6.3 The employee shall also notify the employer of changes of address or other contact details which might affect the employer's capacity to comply with Sub-paragraph 33.6.1.

33.7 Adoption Leave

Any employee may take unpaid leave in connection with the adoption of a child under five years of age for a maximum of 52 weeks. Additional adoption leave provisions are as per the Ausgrid Parental Leave Policy as at 19 December 2010.

34 CAREER BREAK

34.1 Employees are eligible to apply for a career break to meet personal, family or community responsibilities, e.g. study, child rearing, looking after a sick relative, personal development, etc.

34.2 A career break provides between three (3) months and one (1) year of unpaid leave and may be combined with other leave to provide a total period of absence up to two (2) years.

34.3 Employees who take a career break maintain continuity of employment but the period of leave does not count for service.

34.4 Employees who take a career break will be able to return to either their old position or an equivalent position.

35 DOMESTIC VIOLENCE

35.1 General Principle

35.1.1 Ausgrid recognises that employees sometimes face situations of violence or abuse in their personal life that may affect their attendance or performance at work. Therefore, Ausgrid is committed to providing support to staff that experience domestic violence.

35.2 Definition of Domestic Violence

35.2.1 Domestic violence includes physical, sexual, financial, verbal or emotional abuse by an immediate family member as defined in this Agreement.

35.3 General Measures

35.3.1 Proof of domestic violence may be required and can be in the form an agreed document issued by the Police Service, a Court, a Doctor, a Domestic Violence Support Service or Lawyer.

35.3.2 All personal information concerning domestic violence will be kept confidential in line with Ausgrid Policy and relevant legislation. No information will be kept on an employee's personnel file without their express written permission.

35.3.3 No adverse action will be taken against an employee if their attendance or performance at work suffers as a result of experiencing domestic violence.

35.3.4 Ausgrid will identify a contact in Human Resources who will be trained in domestic violence and privacy issues. Ausgrid will advertise the name of the contact within the organisation.

35.3.5 An employee experiencing domestic violence may raise the issue with their immediate supervisor or the Human Resources contact. The supervisor may seek advice from Human Resources if the employee chooses not to see the Human Resources contact.

35.3.6 Where requested by an employee, the Human Resources contact will liaise with the employee's supervisor on the employee's behalf, and will make a recommendation on the most appropriate form of support to provide in accordance with sub clauses 35.4 and 35.5.

35.3.7 Ausgrid will develop guidelines to supplement this clause and which details the appropriate action to be taken in the event that an employee reports domestic violence.

35.4 Leave

35.4.1 An employee experiencing domestic violence will have access to 20 days per year of paid special leave for medical appointment, legal proceedings and other matters and activities arising from domestic violence.

35.4.2 This leave will be in addition to existing leave entitlements and may be taken as consecutive or single days or as a fraction of a day and can be taken without prior approval.

35.4.3 An employee who supports a person experiencing domestic violence may take carer's leave to accompany them to court, to hospital, or to mind children.

35.5 Individual Support

35.5.1 In order to provide support to an employee experiencing domestic violence and to provide a safe work environment to all employees, Ausgrid will approve any reasonable request from an employee experiencing domestic violence for:

35.5.1.1 Changes to their span of hours or pattern or hours and/or shift patterns;

35.5.1.2 Job redesign or changes to duties;

35.5.1.3 Relocation to suitable employment within the Ausgrid;

35.5.1.4 A change to their telephone number or email address to avoid harassing contact;

35.5.1.5 Any other appropriate measure including those available under existing provisions for family friendly and flexible work arrangements.

35.5.2 An employee experiencing domestic violence will referred to the Employee Assistance Program (EAP) and/or other local resources. The EAP shall include professionals trained specifically in domestic violence.

36 AGREEMENT/PUBLIC HOLIDAYS

36.1 The days on which the following holidays are gazetted shall be days off work without loss of pay:

New Year's Day
Australia Day
Ausgrid Employee Day*
Good Friday
Easter Saturday
Easter Sunday
Easter Monday
Anzac Day
Queen's Birthday
Labour Day
Christmas Day
Boxing Day

36.2 Ausgrid Employee Day is an employee day for all employees who are covered under this Agreement and is in substitution for the first day, or part-day, declared or prescribed by or under a law of a State or Territory to be observed within a region of the State.

*For ex-Sydney Electricity employees this will be the second Friday in March. For ex-Orion Energy employees this will be a day determined between the persons covered by this Agreement.

36.3 In addition, employees shall be entitled to the day off work without loss of pay for any other days which are gazetted as Public Holidays throughout NSW.

36.4 Any Agreement/Public Holiday which falls during a period of annual leave, sick leave or long service leave shall not be debited against that leave.

36.5 If an Agreement/Public Holiday occurs on an employee's scheduled day off or RDO then the employee shall receive an additional day's pay at the ordinary rate or shall be entitled to another day off in lieu.

36.6 An employee who is absent from duty without approval on the working day prior to, or the working day after, an Agreement/Public Holiday shall not be entitled to pay for that holiday or the unauthorised absence.

36.7 Where an employee has been on unauthorised leave for more than five (5) consecutive working days, which may include an RDO, the employee is not eligible to be paid for any Agreement/Public Holidays which occur during the leave.

36.8 An employee who is on call on an Agreement/Public Holiday shall be entitled to another day off in lieu.

37 ROSTERED DAYS OFF (RDO)

37.1 A rostered day off occurs in the system of working a nine (9) day fortnight and is defined as a weekday Monday to Friday on which an employee is not required to work because the employee has worked additional time which has accrued towards a day off.

The normal working arrangement for employees is nine (9) eight (8) hour days per fortnight and RDOs are normally taken on a Monday or Friday.

This may be varied using a Workplace Flexibility Agreement.

37.1.1 Those employees working in the Contact Centre as Customer Service Representatives or Team Leaders with access to RDOs shall have their RDOs rostered on a rolling basis across Monday to Friday with a three (3) month timetable, based on business requirements.

37.2 Employees can accumulate up to five (5) RDOs which can be taken at any time subject to mutual agreement after having regard to the needs of the work area and the needs of the employees.

This may be varied by using an individual flexibility arrangement in accordance with clause 25.

When an employee takes more than two (2) consecutive RDOs and another employee acts in his/her job, then that employee shall be eligible for higher grade pay.

37.3 If employees need time off for an emergency or unforseen event, they are encouraged to use accumulated RDOs or to take a RDO in advance. In all circumstances, the employee should provide his/her manager with as much notice as possible before commencing the absence.

37.4 RDOs may only be taken once they have been accrued. The number of RDOs which an employee may take in a year when four (4) weeks annual leave is taken, is limited to 24.

37.5 During the life of this agreement the persons covered by it will implement consistency between current practices and this clause and appendix two of the agreement

38 TERMS OF EMPLOYMENT

38.1 Ausgrid shall give an employee the following periods of notice or payment in lieu:

Employee's period of continuous service with Ausgrid (See Clause 39 Calculation of Service)	Period of Notice
Less than 1 year	1 week
Between 1 and 3 years	2 weeks
Between 3 and 5 years	3 weeks
More than 5 years	4 weeks

This period of notice given by Ausgrid is increased by one (1) week if the employee is over 45 years of age and has completed at least two (2) years of continuous service with Ausgrid.

This shall not limit Ausgrid's right to dismiss an employee without notice for serious misconduct.

Employees shall provide Ausgrid with not less than one week's notice of termination or forfeit one week's wages in lieu.

38.2 If an employee is absent without notifying Ausgrid for a continuous period of five (5) working days (including RDOs) without reasonable cause, they will be considered to have abandoned their employment and may be dismissed effective from the last day actually worked.

38.3 The decision to dismiss an employee shall rest with the relevant General Manager.

38.4 An employee may retire from Ausgrid after reaching 55 years of age.

38.5 An employee may be required to work reasonable overtime, unless the employee has reasonable grounds for refusing.

38.6 Money cannot be deducted from an employee's pay without written authority from the employee except where an employee leaves Ausgrid and annual leave has been taken in advance but has not yet accrued on a pro rata basis.

38.7 Employees are not entitled to pay in the following circumstances:

38.7.1 where an employee is absent without authorisation, or

38.7.2 where an employee is absent due to sickness but has no entitlement to paid sick leave.

38.8 Suspension without pay for an appropriate time may be applied as an alternative to dismissal. This should be discussed with the employee and the relevant union before a final decision is made.

38.9 Where a role covered by this agreement has become redundant then the employee in that role will be managed in accordance with the Ausgrid Redundancy and Redeployment Policy.

38.10 The redundancy policy for the term of this agreement is the Ausgrid Redundancy and Redeployment Policy dated 17/5/2013.

38.11 The salary maintenance policy for the term of this agreement is the Memorandum of Understanding – Salary Maintenance dated 11 April 1997.

39 CALCULATION OF SERVICE

39.1 All service as an apprentice, trainee or cadet shall count towards service entitlements under this Agreement.

39.2 The following periods will not count for service and will not break the continuity of service with Ausgrid;

39.2.1 Sick leave without pay

39.2.2 Parental leave without pay

39.2.3 Leave without pay, whether authorised or not

39.2.4 Career Break.

Leave without pay can be assessed on a case by case basis by Ausgrid to determine whether or not it will count for service.

39.3 Where Ausgrid has terminated an employee's employment because of ill health or injury, and the employee is subsequently retired, the total length of service shall be taken into account in calculating the employee's entitlements.

39.4 Employees who commenced duties with Ausgrid as a result of the amalgamations and mergers of Shires, Municipalities and County Councils on or prior to 1 January 1980 and mergers in 1995 shall have their previous service recognised in calculating their service entitlements.

39.5 From date of corporatisation of EnergyAustralia, 1 March 1996, the following service counts for long service (extended) leave purposes for staff employed by Ausgrid as at 1 March 1996:

39.5.1 Prior service with approved Government Departments will be recognised; this provision only applies for employees who were employed before 1 March 1996.

39.5.2 Prior service with approved NSW Authorities will be recognised.

39.5.3 Prior service with former Local Government regulated distributors which were engaged in electricity distribution will be recognised.

39.5.4 Prior service with approved State-Owned Corporations will be recognised.

Prior service with the Australian Public Service will no longer be recognised after 1 March, 1996.

39.6 New employees recruited from the New South Wales Public Service after 1 March 1996, will continue to have the option of transferring their existing extended leave, recreation leave and sick leave balances to Ausgrid, subject to the existing arrangements for transfer of funds from the previous employer.

39.7 For the purposes of 39.5 and 39.6 above, the period of service for recognition must be 'continuous', which is defined as follows;

39.7.1 the employee entered on duty in Ausgrid on the next working day following cessation of employment with the recognised former employer; or

39.7.2 the employee has been accepted for employment by Ausgrid prior to the last day of service with the recognised former employer, in which case a break of up to two (2) months may be allowed between cessation of duty with the former recognised employer and commencement of employment with Ausgrid.

39.8 The Manager Employment Operations shall determine whether any transferred officer's application is relevant in accordance with the relevant legislation and policy and administer those applications which accord with the appropriate criteria. A list of employers recognised for prior service is attached to this agreement at schedule 5 but does not form part of the agreement.

40 CASHING IN SICK LEAVE

40.1 Where an employee requests during the course of his or her employment, or on termination of employment for any reason other than serious misconduct; the employee shall be paid his or her accumulated untaken sick leave at the ordinary rate of pay applicable to the employee at that time or 1 July 2009 whichever date is earlier.

40.2 The maximum number of hours of sick leave that may be cashed in is to be calculated as follows:

Step 1: Calculate the number of hours of accumulated sick leave as at the date of request to be paid, or termination of employment.

Step 2: Calculate the number of hours of accumulated sick leave as at 15 February 1993 that the employee could have cashed-in if his or her employment had been terminated immediately before 15 February 1993.

The maximum number of hours of accumulated sick leave that may be cashed-in is the lesser of the two numbers calculated under Step 1 and Step 2.

40.3 The intention of subclauses 40.1 and 40.2 above is to ensure that when an employee is obliged to use sick leave credits accumulated prior to 15 February 1993 then such sick leave will be re-credited to the pre 15 February 1993 balance when the employee is again entitled to annual sick leave credits available in the following year of service.

41 EXCESS TRAVEL

41.1 Excess travel time is defined as additional travelling time incurred by an employee in the following circumstances where:

41.1.1 the employee is directed to start work at a location which takes longer to travel to or from their home than to the usual place of work.

41.1.2 the employee is transferred to a new place of work which takes longer to travel to or from their home than to the former place of work. See also Sub-clause 41.2.

41.1.3 the employee is required to work overtime or is called out on a day which is not their normal working day. See also Sub-clause 41.5.

Where the employee does not have a usual place of work but instead has a nominal headquarters to which they are attached, for the purpose of calculating excess travel the headquarters are treated as the usual place of work.

41.2 Where an employee is transferred to a new place of work, payment for any excess travel shall only continue for the first six (6) months. This does not include transfers

or appointments made at the employee's request or which are made for disciplinary reasons.

41.3 Payments for excess travel shall be calculated by estimating the actual travel time and distance by road. Excess travel time shall be calculated at ordinary rates for journeys undertaken Monday to Saturday inclusive and at ordinary time plus a half on Sundays and Agreement/Public Holidays. This does not apply to travel time undertaken for a call-out which is covered in Sub-clause 41.5.

Reimbursement for the distance travelled is not paid in any circumstances where an employee travels in an Ausgrid vehicle.

41.4 Excess travel is not paid for journeys undertaken during work time.

41.5 Where an employee is called out, all travelling time is paid at the appropriate overtime rate. The minimum payment of four (4) hours includes any excess travel time where the total time for the job plus travel to and from the job is four (4) hours or less.

41.6 An employee will be paid for his/her actual excess travel time and fares or the amount calculated under 41.3 above, whichever is the greater. Where an employee believes he/she has not at least been paid for the actual excess travel time and fares, he/she should submit a claim providing sufficient details about the actual mode of transport and the duration of travel for the claim to be assessed and paid.

41.7 Employees who travel in an Ausgrid vehicle are only entitled to payment for any excess travel time which exceeds 30 minutes per journey except when they are called out or work overtime on a day which is not a normal working day; in this case they are entitled to payment for all travelling time.

41.8 Notwithstanding Sub-clause 41.7 above, employees who travel to and from work in an Ausgrid vehicle shall not be entitled to payment for excess travel if the payment means it is no longer worthwhile to Ausgrid for the employee to take a vehicle to and from work. Payment for excess travel to employees who use an Ausgrid vehicle must be authorised by the relevant General Manager.

41.9 This clause applies except where a Local Workplace Flexibility Agreement is in place.

42 PROVISION OF TRANSPORT

Where an employee is directed to work overtime or on a shift on which they are not regularly rostered and they finish work at a time when reasonable means of transport is not available, Ausgrid shall provide the employee with a conveyance to the employee's home.

43 PROTECTIVE CLOTHING AND EQUIPMENT

43.1 Each employee shall be responsible for the proper care of tools and proper care and laundering of protective clothing issued to them.

43.2 New protective clothing and equipment and tools will be issued as required to replace items which are subject to normal wear and tear.

43.3 Employees will be issued with protective clothing, tools and equipment which is suitable for carrying out work safely in the prevailing conditions.

43.4 Employees may be required to replace any protective clothing, tools or equipment which is damaged as a result of misuse or negligence.

43.5 Employees are not permitted to use protective clothing, tools, vehicles or equipment which is provided by Ausgrid while engaged in any employment other than with Ausgrid.

43.6 Employees who are provided with protective clothing shall wear it.

43.7 Ausgrid's policy on protective clothing will be based on the recommendations of the joint employer/employee/union Clothing Committee.

44 HIGHER GRADE PAY

44.1 The introduction of skills-based classifications means that higher grade pay will no longer be applicable within classification groupings because employees will be paid for the full range of duties that they would be expected to use from time to time. Higher Grade duties still apply where employees take on higher responsibilities and duties which are beyond the scope of their classification grouping, e.g. a Technician acting as a Field Co-ordinator, Superintendent etc.

44.2 Employees who are required to carry out duties of a higher grade which are not recognised within the scope of their normal classification grouping shall be paid the appropriate higher rate for the actual period involved, provided they carry out the duties for a minimum of one (1) hour continuously.

44.3 If an employee has been receiving higher grade pay for a continuous period of 13 weeks immediately prior to commencing annual leave, sick leave or accident leave, the employee will be paid the higher grade rate for the duration of the absence. Absences on approved leave of five (5) days or less aggregate duration will not cause a break in continuity for the purposes of this sub-clause. In all cases, the payment of higher grade pay whilst on leave will not exceed six (6) months duration. Breaks in Higher Grade duties of five (5) days or less aggregate duration shall not cause a break in continuity for the purposes of this sub-clause.

44.4 Agreement/Public Holidays during a period of higher grade duty will be paid at the higher rate.

44.5 The higher grade rate will not apply to long service leave or payments made for service entitlements at the termination of employment.

44.6 Higher grade pay is paid to an employee who is required to perform higher grade duties to cover the work of an employee who is absent for more than two (2) days taken as RDOs.

44.7 Undertaking on the job training in a higher graded position does not entitle an employee to higher grade pay unless the person is actually given responsibility for the job, e.g. in a relief role.

44.8 Except where an employee is relieving in a vacancy created by an employee on approved leave, such as parental leave or long service leave, or the work area is being restructured, a period of higher grade pay shall not continue for more than six (6) months before the job is advertised.

45 SUPERANNUATION

45.1 Supplementary Superannuation

This sub-clause applies to employees who:

45.1.1 were employed by Sydney County Council on or before 31 March 1977; and

45.1.2 contributed to the same Local Government Superannuation Scheme on 30 April 1990 that he/she was contributing to on 31 March 1977; and

45.1.3 compulsorily transferred to the State Authorities Superannuation Scheme on May 1990; and

45.1.4 have completed at least 20 years' continuous service with Ausgrid and Sydney County Council; and

45.1.5 retirement age or retired ill-health or was dismissed for reasons other than misconduct or took voluntary redundancy or died whilst still employed.

45.1.6 Employees who meet all the above conditions shall be paid a supplementary superannuation benefit equal to the difference between

$$E = 3.5 + 0.07 (S - 20)$$

where E = the employee's entitlement measured in weeks of pay per year of service at their ordinary rate

and S = 45 or the total number of years service (including a portion for part completed years to the nearest whole month) whichever is the lesser, and;

45.1.7 The monetary benefits directly attributable to all payments made or to be made in respect of the employee by Ausgrid or any other employer under the provisions of the Local Government and other Authorities (Superannuation) Act 1927 and the State Authorities Superannuation Act 1987 or it successor.

45.1.8 This sub-clause shall not apply to an employee who is a contributor under the provisions of the Superannuation Act 1916.

45.1.9 This sub-clause also applies to employees who were formerly employed by a County Council and who were transferred to Sydney County Council (EnergyAustralia/Ausgrid) on 1 January 1980 provided that,

45.1.9.1 they maintained continuity of service in the transfer

45.1.9.2 they fulfil the requirements in Sub-clause 45.1.1 of this clause

if they meet these criteria, service with Brisbane Waters, St George and MacKellar County Councils prior to being transferred to Sydney County Council (EnergyAustralia/Ausgrid) on 1 January 1980 will be counted in calculating any entitlement under this clause.

45.1.10 This sub-clause applies to employees who were employed by the former Shortland County Council/Orion Energy.

Where the service of an employee is terminated by retirement age, retirement ill health or death, the employee, or in the latter case, his legal representative, shall be paid a severance allowance equal to:

the amount calculated at the rate of the employee's final average salary as defined in Section 24 of Part V of the Public Authorities Superannuation Act, 1985, payable at the date of termination based on 5.616 weeks for each completed year the employee was a contributor under the aforesaid Act and proportionately for any fraction of a year on a monthly basis with a maximum period of 224.64 weeks

less:-

the monetary benefits directly attributable to all payments made or to be made in respect of the employee by the provisions of the Public Authorities Superannuation Act, 1985 those benefits being the amount calculated in accordance with the formula set out in Section 26 of the said Act.

45.1.11 Notwithstanding the above mentioned provisions, the severance allowance payable to an employee or an employee's legal representative shall not exceed a sum equivalent to two (2) weeks salary or wage for each year of the employee's local government service and proportionately for a fraction of a year on a monthly basis.

45.2 Default Superannuation Scheme

Subject to the provisions of relevant superannuation legislation, employees under this Agreement will have their superannuation contributions paid into the Energy Industries Superannuation Scheme (EISS) unless the employee nominates in writing to the General Manager People & Services or their nominee, an alternative superannuation fund which complies with relevant superannuation legislation.

45.3 Wage Sacrifice To Superannuation

45.3.1 An employee may elect in lieu of being paid an amount of wages to have an equivalent amount paid by way of Superannuation contributions in accordance with the relevant provisions of the EISS.

45.3.2 Where an employee has elected to have an amount paid by way of Superannuation contributions in lieu of wages, any allowance, penalty, payment for unused leave entitlements, weekly worker's compensation or other payment, other than any payment for leave taken in service to which an employee is entitled under this Agreement or any applicable Agreement, Act or Statute which is expressed to be determined by reference to an employee's wage, shall be calculated by reference to the actual wages paid to the employee and the amount paid under Sub-clause 45.3.1 by way of Superannuation contributions.

45.3.3 Subject to the provisions of relevant superannuation legislation, any Superannuation contributions paid under Sub-clause 45.3 shall be paid to the EISS.

45.3.4 The employee may elect to have an amount paid by way of Superannuation contributions in lieu of wages on joining Ausgrid and thereafter may alter the amount paid by way of Superannuation contributions under Sub-clause 45.3 with effect from 1 July each year.

45.3.5 An election to have Superannuation contributions paid in lieu of an amount of wages shall be in writing and may only be made with the consent of both the employee and Ausgrid.

45.4 Additional Employer Superannuation Contribution

45.4.1 All employees will receive a 1% increase to their employer superannuation contribution in addition to their existing arrangements effective from 19 December 2008 (SGC+5% = 14% in total) with a further 1% increase effective from 19 December 2009 (SGC +6% = 15% in total).

45.4.2 Should any increase to the Commonwealth Government Superannuation Guarantee (SGC) occur during the term of this agreement these increases will be absorbed.

45.4.3 Persons covered by this agreement who are in the Defined Benefit Superannuation Scheme will have any SGC increase absorbed in the 6% employer contribution.

46 APPRENTICES

46.1 Apprentices who are appointed to a trades position in Ausgrid shall be paid the appropriate full adult rate.

46.2 When an apprentice reaches the age of 21 they shall be paid the adult apprentice rates in Appendix 1E.

46.3 Internal Adult apprentices will be paid the rate listed in appendix 1E for the duration of their apprenticeship.

46.4 Apprentices may not be required to undertake shift work or overtime where it clashes with their training.

47 MISCELLANEOUS CONDITIONS OF EMPLOYMENT

47.1 An employee who is on or below Pay Point 40 and is required to be an authorised motor vehicle driver or who is required to hold a licence to operate plant or equipment, will have the cost of that licence(s) reimbursed.

47.2 Nominated employees who are required to take or make business calls at home will be reimbursed the cost of telephone rental and/or business calls as determined by Ausgrid or provided with a mobile phone.

47.3 On the death of an employee, all their outstanding entitlements and accruals will be paid to their estate except where the employee has provided a written instruction to pay them to next of kin.

47.4 An employee who is authorised and agrees to use a private motor vehicle in the course of their employment shall be paid the rate in Appendix 1D, Extra Rates, Item No. 33, if the employee maintains the minimum of third party property damage insurance policy on that vehicle. However, wherever possible employees should use an Ausgrid vehicle for all purposes connected with their employment.

47.5 Where an employee is supplied with a residence (with or without concessions) the weekly value of such residence (and concessions) shall be agreed upon from time to time between the persons covered by this Agreement and in the event of failure to agree, shall be dealt with pursuant to the disputes procedures contained in Clause 4.

48 NO EXTRA CLAIMS

It is a term of this Agreement that the persons covered by this Agreement undertake that for the period of the duration of this Agreement that they will not pursue any extra claims, Agreement or over Agreement.

49 UNION DELEGATES' CHARTER

49.1 Ausgrid shall be able to:

49.1.1 Expect that employees, be they Union Delegates or not, will perform the job in which they are employed.

49.1.2 Be given reasonable notice by Delegates that they intend to carry out their Union duties.

49.1.3 Expect that Union Delegate(s) shall not be able to claim or be paid overtime for attendance at Delegates meetings organised during normal working hours.

49.2 Union Delegates shall be able to:

49.2.1 Approach, or be approached by a member for the payment of Union dues or other payments, or to discuss any matter related to this member's employment, during working hours.

49.2.2 After obtaining the permission of the employer, move freely for the purpose of consulting other Delegates during working hours.

49.2.3 To negotiate with management together with other union delegates on behalf of all or part of the members on any matters in accord with Union policy affecting the employment of members who work in Ausgrid.

49.2.4 Call meetings and for members to attend these meetings on the job. Such meetings are to be outside of work time unless prior permission is obtained from management.

49.2.5 Have protection from victimisation and this right to be expressed in prohibiting the employer from seeking to separate the delegate from the union members who elected them without first consulting the union.

49.2.6 Have access to a telephone and computer, including email and to have within their work proximity suitable cupboards and furniture to enable them to keep records, union circulars, receipt books etc. so as to efficiently carry out their union responsibilities.

49.2.7 Attend meetings and training held by the Union in which they hold office without loss of any rights following the approval of Ausgrid. Attendance at these meetings shall be permitted according to the provisions of Clause 30 Special Leave of the Ausgrid Agreement

49.2.8 Have all agreements and arrangements negotiated with Ausgrid set out in writing and for these agreements and arrangements, including Agreements, to be provided to delegates on request.

49.2.9 Place notices on defined union notice boards.

50 DEDUCTION OF UNION MEMBERSHIP FEES

50.1 The union shall provide the employer with a schedule setting out union weekly membership fees payable by members of the union in accordance with the union's rules.

50.2 The union shall advise the employer of any change to the amount of weekly membership fees made under its rules. Any variation to the schedule of union weekly membership fees payable shall be provided to the employer at least one month in advance of the variation taking effect.

50.3 Subject to the above, the employer shall deduct union weekly membership fees from the pay of any employee who is a member of the union in accordance with the union's rules, provided that the employee has authorised the employer to make such deductions.

50.4 Monies so deducted from employee's pay shall be forwarded regularly to the union together with all necessary information to enable the union to reconcile and credit subscriptions to employees' union membership accounts.

50.5 Unless other arrangements are agreed to by the employer and the union, all union membership fees shall be deducted on a weekly basis.

50.6 Where an employee has already authorised the deduction of union membership fees from his or her pay prior to this clause taking effect, nothing in this clause shall be read as requiring the employee to make a fresh authorisation in order for such deductions to continue.

Signed for and on behalf of:

TREVOR ARMSTRONG CHIEF OPERATING OFFICER - AUSGRID Ausgrid	570 George Street Sydney NSW 2000 7. 6. 13 Date
PAUL SINCLAIR. Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia	Level 5, 370 Pitt Street Sydney 2000 DEPUTY SECRETARY 11. 6. 13. Date
GRAEME KELLY - GENERAL SECRETARY Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch	Level 7, 321 Pitt street Sydney NSW 2000 14.6.13 Date
MARTIN O'CONNELL Association of Professional Engineers, Scientists and Managers Australia	Level 1, 491 Kent Street Sydney NSW 2000 DIRECTOR, NSW Date 12.6.13
SUZANNE WALSH Community and Public Sector Union	160 Clarence Street Sydney NSW 2000 NSW BRANCH PRESIDENT Date 14.6.13.
R. K. COLLISON Australian Workers' Union	16-20 Good Street Granville NSW 2142 N.S.W. STATE SECRETARY Date 14. 6. 2013.
LORRAINE USHER Construction, Forestry, Mining and Energy Union (Mining and Energy Division) NSW Branch	Level1, ~~365-375 Sussex Street~~ 215-217 CLARENCE STREET Sydney NSW 2000 DISTRICT SECRETARY. 14-6-2013. Date
SEAN MORGAN Australian Manufacturing Workers' Union (Vehicle Division)	Level 1, 133-137 Parramatta Road Granville NSW 2142 REGIONAL SECRETARY. 17/6/13 Date

APPENDIX 1 PAY RATES CLASSIFICATIONS AND ALLOWANCES

Appendix 1A	Ausgrid Junior and Adult Rates of Pay
Appendix 1B	Ausgrid Shift Workers (7x3/7x2) Rates of Pay
Appendix 1C	Ausgrid Classifications
Appendix 1D	Ausgrid Allowances and Extra Rates
Appendix 1E	Ausgrid Adult Apprentice Rates of Pay
Appendix 2	Annual Leave Conversion

Appendix 1A Ausgrid Junior and Adult Rates of Pay

Pay Point	New Rates from 19/12/2012			New Rates from 18/12/2013		
	Annual Salary	Weekly Rate	36 Hrly Rate	Annual Salary	Weekly Rate	36 Hrly Rate
J1	$18,568.00	$355.71	$9.88	$19,069.00	$365.31	$10.15
J2	$19,512.00	$373.79	$10.38	$20,039.00	$383.89	$10.66
J3	$20,480.00	$392.34	$10.90	$21,033.00	$402.93	$11.19
J4	$21,495.00	$411.78	$11.44	$22,075.00	$422.89	$11.75
J5	$22,569.00	$432.36	$12.01	$23,178.00	$444.02	$12.33
J6	$23,701.00	$454.04	$12.61	$24,341.00	$466.30	$12.95
J7	$24,886.00	$476.74	$13.24	$25,558.00	$489.62	$13.60
J8	$26,130.00	$500.57	$13.90	$26,836.00	$514.10	$14.28
J9	$27,428.00	$525.44	$14.60	$28,169.00	$539.64	$14.99
J10	$28,806.00	$551.84	$15.33	$29,584.00	$566.74	$15.74
J11	$30,243.00	$579.37	$16.09	$31,060.00	$595.02	$16.53
J12	$31,752.00	$608.28	$16.90	$32,609.00	$624.69	$17.35
J13	$33,346.00	$638.81	$17.74	$34,246.00	$656.05	$18.22
J14	$34,999.00	$670.48	$18.62	$35,944.00	$688.58	$19.13
J15	$36,758.00	$704.18	$19.56	$37,750.00	$723.18	$20.09
J16	$38,580.00	$739.08	$20.53	$39,622.00	$759.04	$21.08
J17	$40,530.00	$776.44	$21.57	$41,624.00	$797.39	$22.15
J18	$42,542.00	$814.98	$22.64	$43,691.00	$836.99	$23.25
1	$43,597.00	$835.19	$23.20	$44,774.00	$857.74	$23.83
2	$44,462.00	$851.76	$23.66	$45,662.00	$874.75	$24.30
3	$45,322.00	$868.24	$24.12	$46,546.00	$891.69	$24.77
4	$46,199.00	$885.04	$24.58	$47,446.00	$908.93	$25.25
5	$47,106.00	$902.41	$25.07	$48,378.00	$926.78	$25.74
6	$48,013.00	$919.79	$25.55	$49,309.00	$944.62	$26.24
7	$48,949.00	$937.72	$26.05	$50,271.00	$963.05	$26.75
8	$49,916.00	$956.25	$26.56	$51,264.00	$982.07	$27.28
9	$50,909.00	$975.27	$27.09	$52,284.00	$1,001.61	$27.82
10	$51,934.00	$994.90	$27.64	$53,336.00	$1,021.76	$28.38
11	$52,973.00	$1,014.81	$28.19	$54,403.00	$1,042.20	$28.95
12	$54,033.00	$1,035.11	$28.75	$55,492.00	$1,063.07	$29.53
13	$55,129.00	$1,056.11	$29.34	$56,617.00	$1,084.62	$30.13
14	$56,222.00	$1,077.05	$29.92	$57,740.00	$1,106.13	$30.73
15	$57,338.00	$1,098.43	$30.51	$58,886.00	$1,128.08	$31.34
16	$58,483.00	$1,120.36	$31.12	$60,062.00	$1,150.61	$31.96
17	$59,656.00	$1,142.84	$31.75	$61,267.00	$1,173.70	$32.60
18	$60,845.00	$1,165.61	$32.38	$62,488.00	$1,197.09	$33.25
19	$62,078.00	$1,189.23	$33.03	$63,754.00	$1,221.34	$33.93
20	$63,319.00	$1,213.01	$33.69	$65,029.00	$1,245.77	$34.60
21	$64,586.00	$1,237.28	$34.37	$66,330.00	$1,270.69	$35.30
22	$65,863.00	$1,261.74	$35.05	$67,641.00	$1,295.80	$35.99
23	$67,186.00	$1,287.09	$35.75	$69,000.00	$1,321.84	$36.72
24	$68,531.00	$1,312.85	$36.47	$70,381.00	$1,348.30	$37.45
25	$69,900.00	$1,339.08	$37.20	$71,787.00	$1,375.23	$38.20
26	$71,289.00	$1,365.69	$37.94	$73,214.00	$1,402.57	$38.96
27	$72,724.00	$1,393.18	$38.70	$74,688.00	$1,430.80	$39.74
28	$74,171.00	$1,420.90	$39.47	$76,174.00	$1,459.27	$40.54
29	$75,660.00	$1,449.43	$40.26	$77,703.00	$1,488.56	$41.35
30	$77,190.00	$1,478.74	$41.08	$79,274.00	$1,518.66	$42.18
31	$78,710.00	$1,507.85	$41.88	$80,835.00	$1,548.56	$43.02
32	$80,310.00	$1,538.51	$42.74	$82,478.00	$1,580.04	$43.89
33	$81,907.00	$1,569.10	$43.59	$84,118.00	$1,611.46	$44.76

34	$83,537.00	$1,600.33	$44.45	$85,793.00	$1,643.54	$45.65
35	$85,203.00	$1,632.24	$45.34	$87,503.00	$1,676.30	$46.56
36	$86,913.00	$1,665.00	$46.25	$89,260.00	$1,709.96	$47.50
37	$88,657.00	$1,698.41	$47.18	$91,051.00	$1,744.27	$48.45
38	$90,429.00	$1,732.36	$48.12	$92,871.00	$1,779.14	$49.42
39	$92,232.00	$1,766.90	$49.08	$94,722.00	$1,814.60	$50.41
40	$94,085.00	$1,802.39	$50.07	$96,625.00	$1,851.05	$51.42
41	$95,957.00	$1,838.26	$51.06	$98,548.00	$1,887.89	$52.44
42	$97,875.00	$1,875.00	$52.08	$100,518.00	$1,925.63	$53.49
43	$99,826.00	$1,912.38	$53.12	$102,521.00	$1,964.00	$54.56
44	$101,830.00	$1,950.77	$54.19	$104,579.00	$2,003.43	$55.65
45	$103,857.00	$1,989.60	$55.27	$106,661.00	$2,043.31	$56.76
46	$105,956.00	$2,029.81	$56.38	$108,817.00	$2,084.62	$57.91
47	$108,068.00	$2,070.27	$57.51	$110,986.00	$2,126.17	$59.06
48	$110,224.00	$2,111.57	$58.65	$113,200.00	$2,168.58	$60.24
49	$112,440.00	$2,154.02	$59.83	$115,476.00	$2,212.18	$61.45
50	$114,683.00	$2,196.99	$61.03	$117,779.00	$2,256.30	$62.68
51	$116,985.00	$2,241.09	$62.25	$120,144.00	$2,301.61	$63.93
52	$119,315.00	$2,285.73	$63.49	$122,537.00	$2,347.45	$65.21
53	$121,707.00	$2,331.55	$64.77	$124,993.00	$2,394.50	$66.51
54	$124,137.00	$2,378.10	$66.06	$127,489.00	$2,442.32	$67.84
55	$126,632.00	$2,425.90	$67.39	$130,051.00	$2,491.40	$69.21
56	$129,160.00	$2,474.33	$68.73	$132,647.00	$2,541.13	$70.59
57	$131,732.00	$2,523.60	$70.10	$135,289.00	$2,591.74	$71.99
58	$134,370.00	$2,574.14	$71.50	$137,998.00	$2,643.64	$73.43
59	$137,073.00	$2,625.92	$72.94	$140,774.00	$2,696.82	$74.91
60	$139,797.00	$2,678.10	$74.39	$143,572.00	$2,750.42	$76.40

Appendix 1B Ausgrid Shift Rates of Pay

Pay Point	New Rates from 19/12/12			New Rates from 18/12/13		
	Annual Salary	Weekly Rate	Hourly Rate	Annual Salary	Weekly Rate	Hourly Rate
10Y	$52,111	$998.30	$27.73	$53,518	$1,025.25	$28.48
11Y	$53,152	$1,018.24	$28.28	$54,587	$1,045.73	$29.05
12Y	$54,215	$1,038.60	$28.85	$55,679	$1,066.65	$29.63
13Y	$55,316	$1,059.69	$29.44	$56,810	$1,088.31	$30.23
14Y	$56,413	$1,080.71	$30.02	$57,936	$1,109.89	$30.83
15Y	$57,533	$1,102.16	$30.62	$59,086	$1,131.92	$31.44
16Y	$58,680	$1,124.14	$31.23	$60,264	$1,154.48	$32.07
17Y	$59,859	$1,146.72	$31.85	$61,475	$1,177.68	$32.71
18Y	$61,050	$1,169.54	$32.49	$62,698	$1,201.11	$33.36
19Y	$62,290	$1,193.30	$33.15	$63,972	$1,225.52	$34.04
20Y	$63,534	$1,217.13	$33.81	$65,249	$1,249.98	$34.72
21Y	$64,805	$1,241.48	$34.49	$66,555	$1,275.00	$35.42
22Y	$66,085	$1,266.00	$35.17	$67,869	$1,300.17	$36.12
23Y	$67,414	$1,291.46	$35.87	$69,234	$1,326.32	$36.84
24Y	$68,764	$1,317.32	$36.59	$70,621	$1,352.89	$37.58
25Y	$70,137	$1,343.62	$37.32	$72,031	$1,379.90	$38.33
26Y	$71,533	$1,370.36	$38.07	$73,464	$1,407.36	$39.09
27Y	$72,973	$1,397.95	$38.83	$74,943	$1,435.69	$39.88
28Y	$74,425	$1,425.77	$39.60	$76,434	$1,464.25	$40.67
29Y	$75,916	$1,454.33	$40.40	$77,966	$1,493.60	$41.49
30Y	$77,451	$1,483.74	$41.21	$79,542	$1,523.79	$42.33
31Y	$78,978	$1,512.99	$42.03	$81,110	$1,553.83	$43.16
32Y	$80,585	$1,543.77	$42.88	$82,761	$1,585.46	$44.04
33Y	$82,185	$1,574.43	$43.73	$84,404	$1,616.93	$44.91
34Y	$83,821	$1,605.77	$44.60	$86,084	$1,649.12	$45.81
35Y	$85,492	$1,637.78	$45.49	$87,800	$1,681.99	$46.72
36Y	$87,208	$1,670.65	$46.41	$89,563	$1,715.77	$47.66
37Y	$88,957	$1,704.16	$47.34	$91,359	$1,750.17	$48.62
38Y	$90,736	$1,738.24	$48.28	$93,186	$1,785.17	$49.59
39Y	$92,545	$1,772.89	$49.25	$95,044	$1,820.77	$50.58
40Y	$94,404	$1,808.51	$50.24	$96,953	$1,857.34	$51.59
41Y	$96,283	$1,844.50	$51.24	$98,883	$1,894.31	$52.62
42Y	$98,208	$1,881.38	$52.26	$100,860	$1,932.18	$53.67
43Y	$100,164	$1,918.85	$53.30	$102,868	$1,970.65	$54.74
44Y	$102,176	$1,957.39	$54.37	$104,935	$2,010.25	$55.84
45Y	$104,210	$1,996.36	$55.45	$107,024	$2,050.27	$56.95
46Y	$106,316	$2,036.70	$56.58	$109,187	$2,091.70	$58.10
47Y	$108,438	$2,077.36	$57.70	$111,366	$2,133.45	$59.26
48Y	$110,599	$2,118.75	$58.85	$113,585	$2,175.96	$60.44
49Y	$112,822	$2,161.34	$60.04	$115,868	$2,219.69	$61.66

Appendix 1C Ausgrid Classifications

Trades and Technical Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5	6	7	8	9	10	11	12	13
Aborist Contract Inspection	36												
Adult Apprentice	J18	2	4	6									
Apprentice	J10	J14	J17	2									
Area/System Operator	LWFA 1 of 2010												
Area Operator – annualised	48	50	52										
Asset Access Rescue	22												
Asset Access Standby	18												
Asset Research Officer	26												
Assistant System Operator Wallsend	LWFA 1 of 2010												
Building Maintenance Coordinator	30												
Building Maintenance Coordinator ext subs	45												
Building Maintenance Coordinator Property Group	40												
Cable Jointer	15	17	18	19	20	22	23	24	25	26	27	28	
Carpenter	15	16	18	19	20	21							
Chemical Officer	33												
Compliance Officer	36	38	40										
Consultant Engineering	48												
Consultant Engineering Consulting	53												
Contracts Inspector	40												
Contracts Officer	46												
Co-ord net cln & gr mnt	24												
Customer Operations Technical Field Support	32												
Deregulation Management Coordinator	48												
Design Draftsperson	18	21	25	28	32	35	38						
Despatch Co-ordinator	33	37	43										
District Operator	32	41											
Drafting Officer Network Diagrams	29												
Editorial Design Officer	32												
Electrical Field Co-ordinator	38												
Electricity Supply Operative	5	6	7	8	9	10	11	12	13	14	15	16	19
Emergency Services Officer	20	23	26	29	30	32	34						
Energy Fix Project Co-ordinator	43												
Engineering Officer	29	34	37	40	43	46	49	52	54				
Ens cus conn tech snr	24	26											
Ens Customer Connection Technician	15	18	21										
External Customer Metering Officer	45												
Facilities Compliance Co-ordinator	36												
Facilities Manager	48												
Field Co-ordinator t/cont	38												
Field Investigation Technician	15	18	21	24	26								
Field off acct rdng	19												
Field Services Storeperson West Gosford	21												
Field Warehouse Operative	14	16	18	20									
Fleet Assessment and Compliance Officer	43												
Ganger	28	30											

Trades and Technical Group

Garage Trades Assistant	17												
Geospatial Information Officer	20	24	29	33	38								
Heavy Vehicle Driver	9	12	14	16	20								
Homebush Garage Storeman	21												
Hunter Project Co-ordinator	43												
Independent Transmission Cable Jointer	30												
Installation Inspector	26	30	33	35	39								
Instructor Technical and Safety	36												
Internal Adult Apprentice	15												
Lane Cove Supply Operative	21												
Leading Hand Vehicle Body Builder	31												
Learning and Resource Development Officer	47												
Light Fleet Acquisition & Maintenance Officer	38												
Line Inspector	20												
Lineworker	15	17	18	19	20	22	23	24	25	26	27	28	
Lineworker Glove and Barrier	31												
Mains recorder	16	18	20										
Meter Warehouse Superintendent	21												
Metering Operations Co-ordinator	41												
Metering Technician	18	20	22	24	26	28	30	32	34	36			
Mobile Purchasing and Parts Delivery Storeperson	21												
Motor Mechanic	15	17	19	20	24	25	26	28					
Motor Mechanic in Charge	31												
Network and Customer Field Officer	30												
Network Test Electricity Supply Operative	19												
Oil Containment Electricity Supply Operative	16												
Oil Containment Officer	41												
Operating supp asst.	19												
Outage Scheduling Officer	52												
Overhead Field Co-ordinator	36												
Overhead Transmission Electricity Supply Operative	9	11	14	12	20								
Overhead Working Leading Hand	33												
Plant and Motor Vehicle Inspector	29												
Plasterer	18												
Plumber	15	16	18	19	20	21							
Pole Hole b/e Operator	19												
Pole Inspector	12	16											
Poles Leading Hand	24												
Printer	12	22											
Proc off forest prod	40												
Project Delivery Officer	36	38	40	43	45								
Projects Officer Training	40												
Protection Field Co-ordinator	38												
Protection Technician	21	24	25	27	31	32	33	35	36				
Quality Control Officer	27	29	33										
Recording Supervisor	47												
Region Electricity Supply Operative	9	11	14	17	20								
Revenue Protection Officer	38												

Trades and Technical Group

Rigging Co-ordinator	22												
Risk Mitigation Technician	22												
Safety Advisor	38	42											
Safety Advisor Snr	48												
Safety Advisor DOR	39	43											
Safety Advisor DOR Snr	49												
Security Operations Officer	29												
Senior Asset Access Rescue	32												
Senior Carpenter	23	26	28										
Senior Design Structural Draftsperson	26												
Senior District Operator	44												
Senior Editorial Design Officer	38												
Senior Electrical Designer	42												
Senior Electrical Technician	23	25	26	28									
Senior Field Investigation Technician	30												
Senior Installation Inspector	40												
Senior lab mains u/g	23												
Senior national mkt part off	42												
Senior Plumber	26	28											
Senior Safety Advisor	48												
Senior Substation Technician	25	28	29	31	32	33							
Senior Technician	23	25	26	28	29	30							
Senior Telecontrol Technician	36												
Senior Training Officer	45												
Senior Transformer Service Technician	25	28	29	31	32	33							
Senior instr op stds & accred	42	45											
Special Meter Reader	12												
Specialist Project Officer Contract Cable Laying	48												
Substation Field Co-ordinator	38												
Substation Risk Mitigation Field Co-ordinator	38												
Substation Technician	15	18	20	21	22	23							
Superintendent	47	49	51										
Superintendent Level O	45												
Supervising Engineering Officer	54												
Supervisor	28	30	32	35	38	42							
Survey Officer	22	26	29	33	36	39	42	45	48				
System Operator Wallsend	LWFA 1 of 2010												
System Operator (annualised)	57												
TCA Procurement and Contracts Coordinator	49												
TCA Technician	17	19	21	23	25	27	29	31	33				
Team Coordinator	38												
Tech cust supp serv	15	17	19	21									
Tech elec serv	15	18	20	21	22	23							
Tech elec srv snr	25	28	29	31	32	33							
Tech inst	18	22	26	28	32	36	38	40					
Tech inst snr	42	45											
Tech spec meter snr	36												
Tech spec sup srv snr	27												

Trades and Technical Group

Tech supp serv snr	25												
Technical & Information Technology Support Officer	31												
Technical and Training Coordinator	42												
Technical Editor	29	34	37	40	43	45	49	52	54				
Technician	15	16	18	19	20	21							
Telecontrol Technician	21	24	26	28	31	32	34	35	36				
Trainee District Operator	23												
Trainee Engineering Officer	J14	J18	9	14	21								
Trainee Pole Inspector	8												
Training Officer	38												
Trans civil inspector	38												
Transformer Service Technician	15	18	20	21	22	23							
Transmission Cable Electricity Supply Operative	8	10	13	16	19								
Transmission Cable Jointer Trainer	34												
Transmission Oil Technician	21	24	26	28	31	34	36						
Transmission Underground ESO	9	11	14	17	20								
Underground Field Co-ordinator	36												
Vegetation Officer	38												
Vehicle Body Builder	15	17	19	20	24	25	26	28					
Voltage Regulation Technician	21	24	25	26	27	29	31	33	34				
Voltage Regulation Field Coordinator	38												
Warehouse Officer External Sales	21												
Warehouse Operative	10	12	14	16	18	20	22						
Workshop Electricity Supply Operative	9	11	14	17	20								
Workshop Production Planner	23												
Workshops Technician	15	17	19	20	21	23	25	27	28	30			

Clerical and Administrative Group

GRADES/LEVEL/PAYPOINT	1	2	3	4
Admin & Clerical Officer Grade 1	J14	J16	J18	
Admin & Clerical Officer Grade 2	1	3	5	
Admin & Clerical Officer Grade 3	6	8	10	
Admin & Clerical Officer Grade 4	11	13	15	
Admin & Clerical Officer Grade 5	16	18	20	
Admin & Clerical Officer Grade 6	21	23	25	
Admin & Clerical Officer Grade 7	26	28	30	
Admin & Clerical Officer Grade 8	31	33	35	
Admin & Clerical Officer Grade 9	36	38	40	
Admin & Clerical Officer Grade 10	41	43	45	
Admin & Clerical Officer Grade 11	46	48	50	
Admin & Clerical Officer Grade 12	51	52	53	
Contracts Administrator	44			
Customer Service Representative	26			
Depot Recorder	17			
Fleet Business Analysis & System Administration	26			
Security Attendant	18			

GRADES/LEVEL/PAYPOINT	1	2	3	4
Security Surveillance Operative	18			
Student Work Experience	2			
Telephone acct rep	42			
Telephonist	21			

Professional Managers and Specialist Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5
Accountant	51	53	57		
Accountant Grade 1	22	26	31	35	39
Accountant Grade 2	42	45			
Accountant Grade 3	47	49			
Professional Officer Grade 1	22	26	31	35	39
Professional Officer Grade 2	42	45			
Professional Officer Grade 3	47	50			
Snr a/c mgr inst	52				

Engineering Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5
Cadet Engineer	J4	J6	J8	2	4
Engineer Band One	25	29	34	38	41
Engineer Band Two	46	49	53	55	

Professionals, Managers and Specialists

	Annual Salary	
	19/12/12	18/12/13
Level 1	$143,098.15	$146,961.80
Level 2	$151,245.50	$155,329.13
Level 3	$163,740.53	$168,161.52

Appendix 1D Ausgrid Allowances and Extra Rates

Item	Code	Allowance Type		Rate	
			Frequency	19/12/12	18/12/13
1	FAA	First Aid Attendant	per day	$4.67	$4.80
2	FAI	First Aid Instructor	per week	$21.23	$21.80
3	SHA	Afternoon Shift	per shift	$41.47	$42.59
4	NGT	Night Shift	per shift	$45.80	$47.03
5	EMSRA	Early Morning Shift	per shift	$20.73	$21.29
6	O/C	On Call	per week	$235.87	$242.24
7	O/C1	On Call Weekday	per day	$47.17	$48.45
8	O/C2	On Call Weekend	per day	$58.97	$60.56
9	O/C3	Ug Tr On Call Eng	per day	$73.19	$75.17
10	O/C4	Ug Tr On Call Tech	per day	$62.75	$64.45
		Not Used			
		Not Used			
12	MEAL	Meal	per meal	$13.68	$14.05
13	CDMB	Charge Depot Meal Break	per day	$5.66	$5.82
14	CPLB	Charge Plant Meal Break	per day	$4.65	$4.77
		Not Used			
16	ASB	Asbestos	per hour	$0.81	$0.83
17	ASE	Asbestos Eradication	per hour	$2.44	$2.50
18	ACMP	Air Compressor Attendant	per hour	$0.31	$0.32
19	INSL	Insulwool	per hour	$0.81	$0.83
20	DIRT	Dirt	per day	$4.70	$4.83
21	PIT	Cable Pit	per day	$11.11	$11.41
22	COMM	Community Language	per week	$22.06	$22.66
23	SUST	Sustenance Allowance - pre paid accommodation	per day	$82.57	$84.80
		single location up to 35 days - no prepaid accommodation	per day	$254.20	$261.07
		single location after 35 days - no prepaid accommodation	per day	$188.39	$193.47
24	SKR	Skills Retention	per week	$55.58	$57.08
25	SR	Electrical Safety Rules	per week	$129.89	$129.89
26	SREO	ESO Safety Rules -60%	per week	$77.94	$77.94
27	SR80	Non-Elec Trade Safety Rules - 80%	per week	$103.92	$103.92
28	EL	Qualified Electrical Supervisor	per week	$38.13	$39.16
29	PRA	Qualified Supervisor Plumbing etc	per week	$26.21	$26.92
30	PTA	Plumbers Tool	per week	$26.02	$26.72
31	PLTA	Plasterers Tool	per week	$23.68	$24.32
32	CTA	Carpenters Tool	per week	$29.13	$29.91
33	VEH	Private Vehicle Usage	per klm	ATO Rates	

Appendix 1E: Ausgrid Adult Apprentice Rates

Classification	New Rates From	
	19/12/12	18/12/13
1st Year Adult Apprentice	$815.02	$837.02
2nd Year Adult Apprentice	$851.74	$874.74
3rd Year Adult Apprentice	$885.03	$908.92
4th Year Adult Apprentice	$919.77	$944.60
Internal Adult Apprentice	$1,098.44	$1,128.10

APPENDIX 2 ANNUAL LEAVE CONVERSION

METHOD FOR CONVERTING ANNUAL LEAVE AND SICK LEAVE ENTITLEMENTS TO HOURS

This applies to Ausgrid's employees whose ordinary hours of work equal 72 per fortnight.

Employees accrue either 15 or 18 days of sick leave per year, depending on length of service. They also have a statutory entitlement to four (4) weeks annual leave including non working days. Shift workers have an annual leave entitlement of 20 or 25 shifts.

The method of work for these employees is to work eight (8) hours per day over a nine (9) day fortnight. Day workers work five (5) days in the first week and four (4) days in the second. Shift workers average nine (9) days per fortnight over their full roster. Day workers are paid at the appropriate rate for a 36 hour week but actually work 40 hours in the first week and 32 in the second. They work eight (8) hours per day and are paid for eight hours per day RDO. Shift workers are paid according to the actual hours worked each week.

This Agreement provides amongst other things, for the possibility of work being organised into nine (9) hour day/four (4) day weeks and 12 hour day/three (3) day weeks. This requires all sick leave and annual leave entitlements to be recorded in hours and debited in hours.

Sick leave and annual leave are converted to hours according to the following methods. Employees are entitled to 18 days of sick leave and work an eight hour day. Therefore, the annual sick leave entitlement is 144 hours. The annual leave entitlement is also 144 hours because four weeks work is equivalent to four times 36 hours per week.

All sick leave is debited according to the ordinary hours actually worked each day. If the ordinary hours are eight (8), nine (9) or 12 per day then eight (8), nine (9) or 12 hours respectively will be deducted for each day of absence on sick leave.

All annual leave for employees who work a nine (9) day fortnight is deducted at eight (8) hours per day.

Other employees who work shiftwork or nine (9) or 12 ordinary hours per day will have the actual ordinary hours debited from their annual leave. For example, an employee who works 12 ordinary hours per day will only work three (3) days per week. If 12 hours is debited for each day of annual leave, the employee is still entitled to four weeks of annual leave at three days/week.

Similar arrangements will be made for employees who work a 35 hour week.

SCHEDULE 1 – PROFESSIONALS, MANAGERS AND SPECIALISTS AGREEMENT 2012

1 Persons covered by this Agreement

1.1 The persons covered by this Agreement are:

Ausgrid
Association of Professional Engineers, Scientists and Managers Australia, New South Wales Branch [APESMA]
Community and Public Sector Union [CPSU]
Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia [CEPU]
Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch [USU/ASU]

2 Coverage and Duration

2.1 The Agreement regulates the terms and conditions of employment and rates of pay for current and future employees who are covered by this Agreement, in addition to the terms and conditions of the Ausgrid Agreement 2012. Where this Agreement is silent, the Ausgrid Agreement 2012 conditions shall apply. If there is any inconsistency between this Agreement and the Ausgrid Agreement 2012, then this Agreement shall prevail to the extent of the inconsistency. This Agreement shall operate in conjunction with the relevant policies and procedures adopted by Ausgrid from time to time.

2.2 The Agreement shall be made for a period of two (2) years commencing 19 December 2012.

2.3 This Agreement shall operate to regulate the terms and conditions of employment wherever current and future. Employees covered by the Agreement are employed by Ausgrid from time to time.

2.4 Employees in positions covered by the Agreement who are redeployed to a lower graded position shall have their salaries and benefits adjusted in line with prevailing Ausgrid policy on salary maintenance.

2.5 No employee shall be appointed or promoted to a position under this Agreement without first going through a competitive selection process. All positions will be the subject of selection by merit only and at the sole decision of the employer. This clause, at all times, is subject to the conditions and provisions of Ausgrid's Merit Appointment Policy.

3 Salary

3.1 Employees covered by the Agreement will receive rates of pay set out below:

	Annual Salary	
	19/12/12	18/12/13
Level 1	$143,098.15	$146,961.80
Level 2	$151,245.50	$155,329.13
Level 3	$163,740.53	$168,161.52

3.2 The salaries in 3.1 above are payable for all purposes and are inclusive of all allowances and hours of work other than:

3.2.1 Travel or living expenses when working for Ausgrid. This clause operates with respect to Ausgrid policy and procedure.

3.2.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid.

3.2.3 Those entitlements inferred under Clause 10 of this Agreement.

3.2.4 A weekly skills retention allowance, payable for all purposes, for the term of this Agreement only:

Rate per Week	
19/12/12	18/12/13
$55.58	$57.08

3.2.5 Employees who qualify for stage one competency National Professional Engineering Registration shall be paid the weekly all purpose allowance shown in the table below.

Rate per Week	
19/12/12	18/12/13
$72.26	$74.21

3.2.6 Employees who qualify for stage two competency National Professional Engineering Registration shall be paid the weekly all purpose allowance shown in the table below.

Rate per Week	
19/12/12	18/12/13
$155.63	$159.83

3.3 Employees covered by this Agreement are not entitled to Ausgrid Employee Day.

4 Salary Adjustment

4.1 Salary increases received under this Agreement will be exactly the same as those received under the Ausgrid Agreement 2012. The increases will also occur on the same date.

4.2 Those employees under this Agreement who receive a salary that is less than the nominated Pay Point for their respective level will have their salary increased to that level. New appointments to the Agreement will be employed at one of the Pay Points above according to the level of the position they are filling. The Manager's decision is final as to what Pay Point an employee is appointed to.

4.3 Payment of Remuneration

Salaries and employee nominated fringe benefits will be paid fortnightly to those financial institutions nominated by the employee (except in the case of hardship).

4.4 Employees covered by this Agreement will be entitled to any increases in employer sponsored superannuation as outlined under the Ausgrid Agreement 2012.

5 Fringe Benefits

5.1 Employees under this Agreement shall have access to fringe benefits on the basis of salary packaging arrangements. Any changes to fringe benefits tax (FBT) rates or method of calculation will be passed on to employees immediately.

5.2 Salary Packaging is limited to the following items:

- Motor Vehicle(s)
- Superannuation
- Child Care
- Health Benefits
- Mortgage
- Laptop Computer
- Income Protection
- Other benefits as may become available from time to time.

5.2.1 Employees are responsible for meeting 100% of any FBT cost incurred through salary packaging.

5.2.2 Motor vehicle arrangements are subject to the conditions and provisions of Ausgrid's Motor Vehicle Policy.

5.3 All salary packaging arrangements must be prospective (i.e. forward looking) and all arrangements must be provided in writing. Similarly, salary packaging arrangements may be revoked upon provision of written notice.

6 Performance Agreements – Performance / Bonus Review

6.1 The employees in positions covered by this Agreement will be entitled to receive an agreed minimum remuneration in recognition of services for Ausgrid at an agreed standard. Further, those employees shall be entitled to receive additional remuneration for performance determined by reference to key result targets.

6.2 Each year, employees under this Agreement will be required to enter into a Performance Agreement with their Manager. This Performance Agreement will establish the key result areas/targets that the employees will be measured against as part of their annual performance review.

6.3 Each position covered by this Agreement will be the subject of a specific, individual job description to which the key areas/targets will relate.

6.4 The formal performance review will be held in July/August of each year and will be linked to the performance management system of Ausgrid.

6.5 The employee's performance for the year will be assessed against the achievement of these agreed key result areas/targets. Each Performance Agreement will specify the level of achievement/performance and dependent on the employee's performance may result in the payment of additional performance based remuneration to the employee.

The performance-based remuneration will be determined by weighting based on company, divisional and individual performance criteria. Those performance targets will be agreed between the employee and the manager at the time of setting the employee's performance key result areas/targets.

6.6 Each Performance Agreement will provide access to the performance-based remuneration where the employee exceeds nominated performance targets.

6.7 The maximum remuneration for any year will be determined according to the employee's performance based remuneration. The amount paid will depend on the employee's performance against established targets and key result areas as agreed between the employee and their manager.

6.8 The maximum performance based bonus achievable is set at 10% of base salary.

6.9 Completed agreements must be submitted for registration with the senior manager and Manager Human Resource Operations at the beginning of each bonus assessment year; being 1 July – 30 June.

6.10 Employees may elect to have their bonus payments deferred up to a maximum of twelve (12) months.

7 Professionals, Managers and Specialists

7.1 A "Professional, Manager and Specialist" employee is an employee designated by the Divisional General Manager as such.

7.2 An employee designated as a Professional, Manager and Specialist may enter into an individual employment contract with Ausgrid. To the extent that an individual employment contract made under this clause seeks to vary the terms of this Agreement or the Ausgrid Agreement 2012, it will be made in accordance with item 8 of this Agreement and clause 25 of the Ausgrid Agreement 2012.

7.3 This Agreement will only apply to a Professional, Manager and Specialist contract employee for the following:

- Annual Leave
- Sick Leave
- Long Service Leave
- Parental Leave
- Personal/Carer's Leave
- Compassionate/Bereavement Leave
- Career Break
- Miscellaneous Employment Conditions

7.4 Ausgrid will disclose the other terms of Professional, Manager and Specialist employment contracts to the persons covered by this Agreement on a *commercial in confidence* basis. The persons covered by this Agreement may discuss the content and operation of the arrangements from time to time.

7.5 The employment contract for Professional, Manager and Specialist employees will include provisions in relation to:

- Remuneration and Remuneration Review Mechanism
- Motor Vehicle(s)
- Bonuses
- Superannuation
- Remuneration Packaging

7.6 Remuneration and the remaining conditions for Professional, Manager and Specialist contract employees will be contained within the individual contracts and have no connection with this Agreement or any other Agreement covering Ausgrid.

7.7 Existing employees of Ausgrid will have the option to remain on the Professionals, Managers and Specialists Agreement, or accept promotion to the relevant Agreement with coverage of the position. The Agreement remuneration level for Professional, Manager and Specialist positions will be identified in position advertisements for all internally advertised positions and will be advised on inquiry to internal applicants who are applying for externally advertised positions.

8 Individual Variations

8.1 Except as specifically provided, this item 8 is intended to operate in conjunction with and subject to the requirements of clause 25 of the Ausgrid Agreement 2012.

8.2 Whilst based upon a collectively bargained Agreement, the persons covered by this Agreement recognise that each of the positions covered by it are, and will increasingly become, individually specialised and that employees have or may have a desire to tailor their individual employment conditions within the context of this Agreement and the collective bargaining between the persons covered by this Agreement.

8.3 As part of this Agreement an individual will have the option to vary his/her remuneration and conditions of employment by agreement with the employer once during the term of this Agreement, provided that the employee is not disadvantaged when his/her remuneration and conditions are viewed as a whole against the unvaried remuneration and conditions. Variations made under this item 8 may include matters additional to those specified in clause 25.2.1 and 25.2.2 of the Ausgrid Agreement 2012 which shall specifically include but not be limited to variation of hours of work and entitlements above statutory minimums.

8.4 All such variations agreed between the employer and the employee will be notified to the industrial organisation of which the employee is a member on a *commercial in confidence* basis.

8.5 All variations will operate for the duration of this Agreement and until it is replaced or varied.

8.6 Any disputes, claims or grievances regarding variations will be subject to the Dispute Settlement Procedure in Clause 4of the Ausgrid Agreement 2012.

8.7 All individual Variations Agreements must be recorded in writing and will be made in accordance with clause 25 of the Ausgrid Agreement 2012.

9 Hours of Work

9.1 Employees under this Agreement shall work a sufficient number of hours to ensure their duties are adequately performed. This will involve 40 hours per week and will involve working eight (8) hours per day over a five (5) day week or 160 hours per four weeks over 19 days at employee election.

9.2 Employees under this Agreement are not entitled to Rostered Days Off.

10 Overtime

10.1 Overtime will only be paid with the approval of the relevant General Manager (or their delegate). Where it is paid, overtime will be paid in accordance with the provisions of the Ausgrid Agreement 2012.

10.2 The employee and their manager may agree to time off work without deduction from salary for other than incidental overtime.

11 Duties as Directed

11.1 The relevant General Manager may direct employees under this Agreement to carry out such duties at their normal place of employment or other locations (by consultation) as may be required from time to time provided that the duties are within the employee's skill, competence and training, satisfy any relevant professional code of ethics and do not pose a substantial risk of death or personal injury to any person.

12 Multiskilling of Positions

12.1 The persons covered by this Agreement acknowledge that the interests of Ausgrid can be enhanced by the redesign of specific positions and that multiskilling may be appropriate.

12.2 All employees covered by this Agreement may be required by the employer to undertake a reasonable and necessary level of training to facilitate the employee in question being able to perform more and/or different functions and duties than he/she may have performed in the past. This requirement shall be commensurate with, and have regard to, the employee's training, skills and competence to perform such functions and duties to satisfactory and safe standards.

13 Acting in Positions

13.1 Employees who are not employed in a job covered by this Agreement but who act in a position covered by this Agreement shall be paid the salary for the position the appropriate level of remuneration and shall work in accordance with the conditions of this Agreement while acting. Ausgrid Agreement 2012 employees who act in a Professionals, Managers and Specialists Agreement position will not be entitled to either take or accrue rostered days off during the period of so acting.

13.2 Employees who are covered by this Agreement and act in another job covered by this Agreement shall receive the appropriate salary for the job in which they are acting.

13.3 Employees who are covered by this Agreement and who act in a senior contract position shall continue under the conditions of this Agreement but shall be paid according to the minimum remuneration for the said senior contract position or their current rate, whichever is the greater. General Managers/ managers may review and set the higher grade rate where applicable.

13.4 If an employee takes any form of leave during the first 13 weeks of the acting higher grade, the period of leave will not attract the higher rate of payment.

SCHEDULE 2 – ENGINEERS' AGREEMENT 2012

1 Persons covered by this Agreement

1.1 The persons covered by this Agreement are:

- Ausgrid
- Association of Professional Engineers, Scientists and Managers Australia, New South Wales Branch [APESMA]
- Community and Public Sector Union [CPSU]

2 Coverage and Duration

2.1 This Agreement provides coverage of Ausgrid Engineers.

2.2 The Agreement regulates the terms and conditions of employment and rates of pay for current and future engineers who are covered by this Agreement, in addition to the terms and conditions of the Ausgrid Agreement 2012. Where this Agreement is silent, the Ausgrid Agreement 2012 conditions shall apply. If there is any inconsistency between this Agreement and the Ausgrid Agreement 2012, then this Agreement shall prevail to the extent of the inconsistency. This Agreement shall operate in conjunction with relevant policies and procedures adopted by Ausgrid from time to time.

2.3 The Agreement shall be made for a nominal period of two (2) years commencing from 19 December 2012.

2.4 No employee shall be appointed to a position under this Agreement without first going through a competitive selection process. All positions will be the subject of selection by merit only and at the sole decision of the employer. This clause, at all times, is subject to the conditions and provisions of the Ausgrid's Merit Appointment Policy.

3 Salary

3.1 Existing employees covered by this Agreement shall be appointed to the salaries set out below, as from 19 December 2010.

		Annual Salary	
Band	Level	19/12/12	18/12/13
1	1	$69,898.82	$71,786.09
	2	$75,660.55	$77,703.38
	3	$83,536.64	$85,792.13
	4	$90,428.92	$92,870.50
	5	$95,957.19	$98,548.03
2	1	$105,956.56	$108,817.38
	2	$112,439.74	$115,475.61
	3	$121,706.52	$124,992.60
	4	$126,632.27	$130,051.34

3.2 The tabled salaries in 3.1 above are payable for all purposes and are inclusive of all allowances other than:

3.2.1 Travel or living expenses when working for Ausgrid. This clause operates with respect to Ausgrid Agreement 2012 and policy and procedure.

3.2.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid. Employees should refer to the relevant Ausgrid policies and procedures for more information in respect of this clause.

3.2.3 Any entitlements under Clause 8 of this Agreement.

3.2.4 On Call Allowances as outlined in the Ausgrid Agreement 2012.

3.2.5 First Aid Allowance as outlined in the Ausgrid Agreement 2012.

3.2.6 Meal Allowance as outlined in the Ausgrid Agreement 2012.

3.2.7 Private Vehicle Usage – ATO Rates as outline in the Ausgrid Agreement 2012.

3.2.8 A weekly skills retention allowance, payable for all purposes,.

3.2.8.1 Employees who qualify for stage one competency National Professional Engineering Registration shall be paid the weekly all purpose allowance shown in the table below.

Rate per Week	
19/12/12	18/12/13
$72.26	$74.21

3.2.8.2 Employees who qualify for stage two competency National Professional Engineering Registration shall be paid the weekly all purpose allowance shown in the table below.

Rate per Week	
19/12/12	18/12/13
$155.63	$159.83

4 Salary Adjustment

4.1 Salary increases received under this Agreement will be exactly the same as those received under the Ausgrid Agreement 2012. The increases will also occur on the same date.

5 Progression

5.1 Band 1 progression

Engineers appointed to band 1 shall spend a minimum of twelve months at each level before being eligible to progress to the next level. A satisfactory Performance Development System (PDS) result (in accordance with Clause 6) is required each year in order to progress. An engineer shall complete a minimum of 24 months service in band 1 before becoming eligible for appointment to an advertised band 2 position. Shorter periods of service on the program are subject to the approval of EGM-HR or their delegate.

5.2 Progression from band 1 to band 2 will be by Merit Appointment only.

Appointments to band 2 level positions will be made to the Division, meaning that the employee will be required to move from their appointed position to meet the needs of the Division or as part of a development plan established with their Branch or Division manager.

5.3 To progress from band 2 Level 1 to band 2 Level 2 an Engineer must be able to demonstrate

- satisfactory PDS results for two consecutive years at band 2 Level 1.

5.4 To progress from band 2 Level 2 to band 2 Level 3 an Engineer must be able to demonstrate

- satisfactory PDS results for three consecutive years at band 2 Level 2, and
- that they have moved to a new position at band 2 level 2 for 18 months since their original appointment to band 2 (this maybe a longer or shorter period depending on individual development or business need but will not be less than 12 months).

5.5 To progress from band 2 Level 3 to band 2 Level 4 an Engineer must be able to demonstrate

- satisfactory PDS results for four consecutive years at band 2 Level 3, and
- that they are currently registered on the National Professional Engineers Register (NPER) or have obtained Chartered Professional Engineer status.

5.6 Band 3 positions will no longer be advertised and exist on a present occupant only basis. Positions graded at this level for engineers will be placed on the Professional, Managers & Specialist Enterprise Agreement.

5.7 Engineers on band 3 Level 1 will transition under this agreement to band 2 Level 4 at the same pay point.

5.8 Progression outside the provisions of clauses 5.1-5.5 may occur with the approval of the relevant General Manager, in recognition of exceptional achievement, performance, higher workload, or to cater for business needs.

6 Performance Development System

6.1 The performance development process involves engineers and their manager determining what needs to be done during the year, discussing progress, reviewing achievement and giving feedback. Work plans are focused on our corporate goals and single set of shared goals.

6.2 A formal performance progress review should be carried out with the manager or supervisor six (6) months after you have agreed your work plan objectives. The final performance review shall then be carried out at the end of twelve (12) months. The performance development system cycle operates on a financial year basis.

7 Individual Variations

7.1 Except as specifically provided, this item 7 is intended to operate in conjunction with and subject to the requirements of clause 25 of the Ausgrid Agreement 2012.

7.2 As part of this Agreement an individual will have the option to vary his/her remuneration and conditions of employment by agreement with the employer once during the term of this Agreement, provided that the employee is not disadvantaged when his/her remuneration and conditions are viewed as a whole against the unvaried remuneration and conditions. Variations made under this item 7 may include matters additional to those specified in clause 25.2.1 and 25.2.2 of the Ausgrid Agreement 2012 which shall specifically include but not be limited to variation of hours of work and entitlements above statutory minimums.

7.3 All such variations agreed between the employer and the employee will, on request, be notified to the industrial organisation of which the employee is a member on a confidential basis.

7.4 All variations will operate for the duration of this Agreement and until it is replaced or varied.

7.5 Any disputes, claim or grievances regarding variations will be subject to the Dispute Settlement Procedure in Clause 4of the Ausgrid Agreement 2012.

7.6 All individual Variations Agreements must be recorded in writing and will be made in accordance with clause 25 of the Ausgrid Agreement 2012.

8 Overtime

8.1 This clause refers to the Overtime Clause that appears in the Ausgrid Agreement 2012. Any changes to the aforementioned Ausgrid Agreement 2012 Overtime Clause shall take effect in this Agreement. Those people who are required to perform other than incidental overtime will be paid at the appropriate rate.

8.2 This clause applies unless varied by an Individual Variation Agreement.

9 Secondment

9.1 An existing employee covered by this Agreement may be employed under an individual contract of employment for a specific period of time. During that time the terms and conditions of the individual contract will apply to the exclusion of this Agreement. On termination of this period of time/contract the employee will revert back to the employment conditions prescribed by this Agreement.

10 Duties as Directed

10.1 The relevant General Manager may direct employees under this Agreement to carry out such duties at their normal place of employment or other locations (by consultation) as may be required from time to time provided that the duties are within the employee's skill, competence and training.

11 Multiskilling of Positions

11.1 The persons covered by this Agreement acknowledge that the interests of Ausgrid can be enhanced by the redesign of specific positions and that multiskilling may be appropriate.

11.2 All employees covered by this Agreement may be required by the employer to undertake a reasonable level of training to enhance the employee's skill level. This requirement shall be commensurate with and have regard to the employee's training, skills and competence to perform such functions and duties to satisfactory and safe standards. Wherever a position is redesigned or multiskilling of an existing position is identified as a desired outcome, consultation with the affected work group/individual shall take place.

12 Acting in Positions

12.1 Employees who act in a position covered by this Agreement shall be paid the salary for the position as described in Clause 3 and in accordance with the conditions of this Agreement while acting.

12.2 Employees who are covered by this Agreement and who act in a Senior Contract position shall continue under the conditions of this Agreement but shall be paid according to the minimum remuneration for the said Senior Contract position or their current rate, whichever is the greater. General Managers/ managers may review and set the higher grade rate where applicable. Engineers Agreement employees who act in a senior contract position will not be entitled to either take or accrue rostered day off during the period of so acting.

SCHEDULE 3 – EXECUTIVE ASSISTANTS' AGREEMENT 2012

1 Persons covered by this Agreement

1.1 The persons covered by this Agreement are:

- Ausgrid
- Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch [USU/ASU]
- Community and Public Sector Union [CPSU]

2 Coverage and Duration

2.1 This Agreement provides coverage for current and future employees classified as Executive Assistants to Ausgrid's Chief Operating Officer, General Managers and the Corporate Secretariat.

2.2 The Agreement regulates the terms and conditions of employment and rates of pay for current and future employees who are covered by this Agreement, in addition to the terms and conditions of the Ausgrid Agreement 2012. Where this Agreement is silent, the Ausgrid Agreement 2012 conditions shall apply. If there is any inconsistency between this Agreement and the Ausgrid Agreement 2012, then this Agreement shall prevail to the extent of the inconsistency. This Agreement is in force this Agreement shall operate in conjunction with the relevant policies and procedures adopted by Ausgrid from time to time.

2.3 The Agreement shall be made for a period of two (2) years commencing 19 December 2012.

2.4 Employees in positions covered by the Agreement who are redeployed to a lower graded position shall have their salaries and benefits adjusted in line with prevailing Ausgrid policy on salary maintenance.

2.5 No employee shall be appointed or promoted to a position under this Agreement without first going through competitive selection process. All positions will be the subject of selection by merit only and at the sole decision of the employer. This includes promotion or appointment that follows re-evaluation of a position. This clause, at all times, is subject to the conditions and provisions of Ausgrid's Merit Appointment Policy.

3 Salary

3.1 Existing employees covered by this Agreement shall be paid the appropriate wage or salary according to their approved Pay Point within the Administrative/ Clerical pay structure, including any access to Supplementary Pay Points as managed separately by each Division.

3.2 Transferral from Ausgrid Agreement 2012 to Agreement conditions involves the relinquishing of Rostered Days Off (RDOs) for those employees who will meet the standard hours of work as identified at Clause 5, depending on both the business requirements and the individual's needs. Due to the variation of terms required by employees covered by this Agreement with regard to relinquished RDOs, details will be provided in an Individual Variation Agreement, as set out at Clause 5.

3.2.1 An individual who nominates to relinquish any RDOs through an Individual Variation Agreement will have the compensatory amount added to their base salary.

3.2.2 Relinquished RDOs will be compensated at ordinary time only.

3.3 The salaries in 3.1 above are payable for all purposes and are inclusive of all allowances and hours of work other than:

3.3.1 Travel or living expenses when working for Ausgrid. This clause operates with respect to Ausgrid policy and procedure.

3.3.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid.

3.3.3 Any Individual Variation Agreement made, as identified in Clause 5 of this Agreement, in accordance with the agreed guidelines developmed by the persons covered by this Agreement.

4 Performance/Bonus Review

4.1 The employees covered by this Agreement are entitled to receive an agreed minimum remuneration in recognition of services for Ausgrid at an agreed standard. Further, those employees may be entitled to receive additional remuneration for performance determined by reference to key result areas.

4.2 The maximum performance based bonus achievable is set at 10% of base salary as identified in the Individual Variations Agreement.

4.3 Each year, employees under this Agreement will be required to enter into a Performance Agreement with their Manager. This Performance Agreement will establish the key results areas/targets that the employees will be measured against as part of their annual performance review.

4.4 Each position covered by this Agreement will be the subject of a specific, individual job description to which the key areas/targets will relate.

4.5 The formal performance review will be held in July/August of each year and will be linked to the performance management system of Ausgrid.

4.6 The employee's performance for the year will be assessed against the achievement of the agreed key result areas/targets. Each Performance Agreement will specify the level of achievement/performance and dependent on the employee's performance may result in the payment of additional performance based remuneration to the employee.

4.7 The performance based remuneration will be determined by weighting based on 20% divisional and 80% individual performance criteria. Those performance targets will be agreed between the employee and the manager at the time of setting the employee's performance key result areas/targets.

4.8 Each Performance Agreement will provide access to the performance based remuneration where the employee exceeds nominated performance targets.

4.9 The maximum total remuneration, as identified by Clause 4.2, for any year will be determined according to the employee's performance based remuneration outcome. The amount paid will depend on the employee's performance against established targets and key result areas as agreed between the employee and their manager.

4.10 Completed Performance Agreements must be submitted for registration with the Chief Operating Officer, General Manager or Corporate Secretary, and the Remuneration and Benefits Administrator at the beginning of each bonus assessment year, being 1 July – 30 June.

4.11 Achievement of performance related remuneration under this Agreement will operate in accordance with Ausgrid's bonus payment policy.

5 Individual Variations

5.1 Except as specifically provided, this item 5 is intended to operate in conjunction with and subject to the requirements of clause 23 of the Ausgrid Agreement 2012.

5.2 Whilst based upon a collectively bargained Agreement, the persons covered by this Agreement recognise that each of the positions covered by it are and will increasingly become, individually specialised and that employees have or may have a desire to tailor their individual employment conditions within the context of this Agreement and the collective bargaining between the persons covered by this Agreement.

5.3 As part of this Agreement an individual will have the option to vary his/her remuneration and conditions of employment by Agreement with the employer once during the term of this Agreement, provided that the employee is not disadvantaged when his/her remuneration and conditions are viewed as a whole against the unvaried remuneration and conditions. Variations made under this item 5 may include matters additional to those specified in clause 25.2.1 and 25.2.2 of the Ausgrid Agreement 2012 which shall specifically include but not be limited to variation of hours of work and entitlements above statutory minimums.

5.4 All such variations agreed between the employer and the employee will be notified to the industrial organisation of which the employee is a member on a commercial in confidence basis.

5.5 All variations will operate for the duration of this Agreement and until it is replaced or varied.

5.6 Any disputes, claims or grievances regarding variations will be subject to the Dispute Settlement Procedure in Clause 4 of the Ausgrid Agreement 2012.

5.7 All individual variations must be recorded in writing and will be made in accordance with clause 23 of the Ausgrid Agreement 2012.

6 Hours of Work

6.1 Employees under this Agreement shall work a sufficient number of hours to ensure their duties are adequately performed. This will involve 40 hours per week and will involve working eight (8) hours per day over a five (5) day week, unless an Individual Variation Agreement establishes otherwise.

7 Overtime

7.1 Overtime will be paid at the discretion of the individual manager and in accordance with the Ausgrid Agreement 2012.

7.1.1 When receiving phone calls or responding to messages outside normal rostered workings hours or during a rostered day off.

7.1.2 When providing advice or finding solutions outside normal rostered working hours or during a rostered day off.

7.1.3 When required to adjust starting and finishing times to accommodate short term variance in work demands.

8 Fixed Term Employment

8.1 A fixed term employee is one who is engaged for a fixed period of time. "Fixed Term Employment" is defined as a period of employment for the duration of a specific project, or where it is expected that there will not be a continuing need for the position. At the expiry of the term, the employee shall no longer be employed. There is no expectation that fixed term employment will be extended beyond the specified duration or project.

8.2 Fixed term employees shall be paid and be entitled to all the conditions under this Agreement which are appropriate.

8.3 The persons covered by this Agreement will consult and reach agreement before appointments are made under this clause. Ausgrid reserves the right to review the need for the position at the end of the stated term of the period of fixed employment.

8.4 Employees covered by the classifications under the Ausgrid Agreement 2012 may be employed under this provision on a fixed term basis. On completion of the period of fixed term employment, the employee will revert back to Ausgrid Agreement 2012 conditions of employment.

8.5 Any external engagement(s) under this clause are subject to the exhaustion of internal merit appointment alternatives and are for the purpose of providing coverage during extended periods of leave which may be taken by the incumbent employee from time to time.

8.6 Access to performance based remuneration for employees engaged under this clause will be determined by application of Ausgrid's bonus payment policy to the specific conditions of engagement.

9 Secondment

9.1 Where an employee's conditions of employment are covered by this Agreement, the employee may be employed under an Individual Contract of Employment for a specific period of time. On termination of this period of time/contract the employee will revert back to the employment conditions prescribed by this Agreement.

9.2 Where an employee successfully applied for a seconded role covered by the Ausgrid Agreement 2012, all relevant Ausgrid Agreement 2012 conditions and rates of pay of the advertised role shall apply.

10 Duties as Directed

10.1 The relevant General Manager, Chief Operating Officer or Corporate Secretary may direct employees under this Agreement to carry out such duties at their normal place of employment or other locations (by consultation) as may be required from time to time provided that the duties are within the employee's skill, competence and training, and satisfy any relevant professional code of ethics.

11 Competency Development Framework

11.1 The persons covered by this Agreement acknowledge that the continuing development of the positions covered by this Agreement is in the interest of Ausgrid and can be enhanced through a competency framework to compliment the delivery of performance and related remuneration and identify the areas of development for the individual that may be appropriate.

11.2 The competency framework will be aligned to the nationally recognised competency standards, and comply with the National Qualifications Packing Rules in order to gain recognised qualification(s), as established by the Australian National Trading Authority.

11.3 All employees covered by this Agreement may be required by the employer to undertake a reasonable and necessary level of training to facilitate the employee in question being able to perform more and/or different functions and duties than he/she may have performed in the past. This requirement shall be commensurate with, and have a regard to the employee's training, skills and competence to perform such functions and duties to satisfactory and safe standards.

12 Acting in Positions

12.1 Employees who are not employed in a job covered by this Agreement but who act in a position covered by this Agreement shall continue to be employed under the terms of Ausgrid Agreement 2012, but shall be paid the salary for the position at the base grade of the incumbent, without access to the additional Supplementary Pay Points and shall work in accordance with the conditions of this Agreement whilst acting.

12.2 Ausgrid Agreement 2012 employees who act in a position covered by this Agreement are entitled to accrue all rostered days off which occur during the period of acting, up to a maximum of twelve (12) months, in order to meet the hours of work stipulated at Clause 5.

12.2.1 The employee may elect to receive payment for all accrued RDOs, prior to returning to their Ausgrid Australia 2012 position, subject to management approval. Such payment will be made at the base rate paid whilst working under the conditions of this Agreement.

12.2.2 Alternatively the employee may elect to utilise the balance of accrued RDOs as a form of leave, within six (6) months of returning to their Ausgrid Agreement 2012, subject to management approval.

12.2.2.1 Where an employee has been acting in a position covered by this Agreement for the maximum period of twelve (12) months then the election to utilise the balance of RDOs as a form of leave must be within twelve (12) months of returning to their Ausgrid Agreement 2012 position.

12.2.3 The above election at 12.2.2 and 12.2.2.1 must be made prior to commencing in the acting position covered by this Agreement and with the approval of the releasing manager.

12.3 Employees who are covered by this Agreement and act in another job covered by this Agreement shall receive the appropriate salary for the job in which they are acting.

12.4 Employees who are covered by this Agreement and act in a senior contract position shall continue under the conditions of this Agreement but shall be paid according to the minimum remuneration for the said senior contract position or their current rate, whichever is the greater. General Managers/ managers may review and set the higher grade rate where applicable.

12.5 Where an employee successfully applies to act in a position covered by the Ausgrid Agreement 2012, all relevant Ausgrid Agreement 2012 conditions and rate of pay of the acting role shall apply.

12.6 If an employee takes any form of leave during the first 13 weeks of an acting higher grade, the period of leave will not attract the high rate of payment.

12.7 Any application of the performance based remuneration as identified at Clause 4 of this Agreement shall be in accordance with the Ausgrid Bonus Payment Policy.

SCHEDULE 4 – COMMERCIAL GRADUATE'S AGREEMENT 2012

1 Persons covered by this Agreement

1.1 The persons covered by this Agreement are:

- Ausgrid
- Association of Professional Engineers, Scientists and Managers Australia, New South Wales Branch [APESMA]
- Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch [USU/ASU]
- Community and Public Sector Union [CPSU]

2 Coverage and Duration

2.1 The Agreement totally regulates the terms and conditions of employment and rates of pay for current and future employees who are covered by this Agreement, in addition to the Ausgrid Agreement 2012 whilst this Agreement is in force. This Agreement shall operate in conjunction with the relevant policies and procedures adopted by Ausgrid from time to time.

2.2 The Agreement shall be made for a period of two (2) years commencing 19 December 2012.

2.3 This Agreement shall operate to regulate the terms and conditions of employment of current and future employees covered by the Agreement whose letter of appointment states their employment classification to be that of a Commercial Graduate.

2.4 If a Commercial graduate is appointed to an established position within Ausgrid their terms and conditions will cease to be covered by this Agreement and will thereafter be covered by the relevant Agreement covering the classification or position occupied.

3 Declaration

3.1 The persons covered by this Agreement declare that the arrangements contained in this Agreement are intended to be unique pay and conditions arrangements for a small number of employees to be employed as part of a Commercial Graduate Program.

3.2 The persons covered by this Agreement declare that it is not their intention to promote these arrangements as being suitable for employees other than Commercial Graduate Program employees.

4 Salary per annum

4.1

On Commencement	After six Months Subject to satisfactory performance assessment	Second year Subject to satisfactory performance assessment	After 18 Months Subject to satisfactory performance assessment
$51,747.97	$52,782.93	$56,985.62	$58,125.32

4.2 The salaries are payable for all purposes and are inclusive of all allowances and hours of work other than:

4.2.1 Travel or living expenses when working outside Ausgrid's supply area.

4.2.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid.

4.3 Progression beyond the salary in 4.1 above is subject to satisfactory performance against agreed Key Result Areas, negotiated between the employee and supervisor.

5 Hours of Work

5.1 Employees under this Agreement shall work a sufficient number of hours to ensure their duties are adequately performed. This will normally involve work over a five (5) day week, eight (8) hours per day, Monday to Friday. Ordinary hours of work will not exceed 40 per week averaged over 52 weeks.

5.2 The start and finish times shall be agreed with each employee and shall be flexible enough to meet both their personal needs and the needs of the job and the customers.

5.3 Employees are entitled to unpaid break of 30 minutes per day. The exact timing and duration shall be agreed on an ad hoc basis to meet both the employee's needs and the needs of the job and the customers.

5.4 Employees can be grated time off in lieu of additional hours worked with the agreement of their manager. Any additional hours worked shall be reasonable in light of the rates of pay involved.

6 Overtime

6.1 Any additional hours worked shall not be paid separately. Individual employees and individual managers shall agree on time in lieu where appropriate.

7 Public Holidays

7.1 Employees are entitled to be absent from work without loss of ordinary pay for any day which is gazetted as a Public Holiday for the areas in which they would normally work.

7.2 Employees under this Agreement are not entitled to Ausgrid Employee Day.

8 Terms of Employment

8.1 Notice of Termination

8.1.1 Ausgrid shall give an employee four (4) weeks of notice or payment in lieu:

8.1.1.1 This period of notice given by Ausgrid is increased by one (1) week if the employee is over 45 years of age and has completed at least two (2) years of continuous service with Ausgrid.

8.1.1.2 This shall not limit Ausgrid's right to dismiss an employee without notice for serious misconduct.

8.1.1.3 Employees shall provide Ausgrid with not less than four (4) weeks notice of termination or forfeit four (4) week's wages in lieu.

8.2 If an employee is absent without notifying Ausgrid for a continuous period of five (5) working days without reasonable cause, they will be considered to have abandoned their employment and may be dismissed effective from the last day actually work.

8.3 The decision to dismiss an employee shall rest with the General Manager.

8.4 Money cannot be deducted from an employee's pay without written authority from the employee except where an employee resigns and annual leave has been taken in advance but has not yet accrued on a pro rata basis.

8.5 Employees are not entitled to pay in the following circumstances:

8.5.1 Where an employee is absent without authorisation, or

8.5.2 Where an employee is absent due to sickness but has no entitlement to paid sick leave.

8.6 Suspension without pay for an appropriate time may be applied as an alternative to dismissal. This should be discussed with the employee and the relevant union before a final decision is made.

8.7 The Ausgrid redundancy policy applies to individuals under this Agreement.

9 Duties as Directed

9.1 The relevant General Manager may direct employees under this Agreement to carry out such duties at their normal place of employment or other locations as may be required from time to time provided that the duties are within the employee's skill, competence and training, and satisfy any relevant professional code of ethics and do not pose a substantial risk of death or personal injury to any person.

10 Miscellaneous Conditions of Employment

10.1 Further Education Expenses

Compulsory text books and self education expenses will be 100% refundable, subject to on going satisfactory work performance and successful completion of all subjects.

SCHEDULE 5 -- ATTACHMENT which is attached for clarity but is not part of the agreement

This Schedule 5 contains:

Employers recognised for Prior Service

Employers Recognised for Prior Service

Recognised NSW Government Departments as at 26 July 1996

Department of Aboriginal Affairs
Ageing and Disability Department
Department of Agriculture
Ministry for the Arts, including
Powerhouse Museum
Attorney General's Department
The Audit Office of New South Wales
Office of the Board of Studies
Building Services Corporation
Department of Bush Fire Services
Department of Business and Regional Development
Cabinet Office
Community Services Commission
Motor Accidents Authority
National Parks and Wildlife Service
New South Wales Fire Brigades
New South Wales Meat Industry Authority
Olympic Co-ordination Authority
Ombudsman's Office
Parliamentary Counsel's Office
Ministry for Police and Emergency Services
Premiere's Department
Public Trust Office
Department of Public Works and Services
Royal Botanic Gardens and Domain Trust
Rural Assistance Authority
Department of School Education
Department of Sport and Recreation
Department of State Development
State Electoral Office
State Emergency Service
State Forests, Forestry Commission
Tourism New South Wales
Department of Training and Education Co-ordination
Department of Transport
The Treasury
Department of Foreign Affairs
Department of Corrective Services
New South Wales Crime Commission
New South Wales Dairy Corporation
Darling Harbour Authority
Department of Community Services
Office of the Director of Public Prosecutions
Department of Energy
Environment Protection Authority
Ethnic Affairs Commission
NSW Fisheries
Forestry Commission (except State Forests)
Department of Gaming and Racing
Department of Health Care Complaints Commission

Recognised NSW Government Departments as at 26 July 1996

Home Purchase Assistance Authority
HomeFund Commissioner's Office
Department of Housing
Department of Industrial Relations
Department of Juvenile Justice
Department of Land and Water Conservation
Legal Aid Commission
Department of Local Government
Department of Mineral Resources
Department of Urban Affairs and Planning
Department for Women
WorkCover Authority

List of Recognised NSW Authorities

Maritime Services Board
Water Conservation and Irrigation Commission
Department of Main Roads (RTA)
Metropolitan Water, Sewerage and Drainage Board (Sydney Water)
Police Force
Department of Railways (State Rail)
Department of Government Transport (State Transit Authority)
Department of Motor Transport
Milk Board
The Legislature
Metropolitan Meat Industry Board
Electricity Commission (PacPower / Transgrid)
Hunter District Water Board
Board of Fire Commissioners of New South Wales
Broken Hill Water Board
State Mines Control Authority
Grain Elevators Board of New South Wales
State Planning Authority of New South Wales
Cobar Water Board
Homebush Bay Ministerial Corporation
State Superannuation Investment and Management Corporation
TAFE Commission
The Auburn District Hospital
The Balmain Hospital
The Bankstown Hospital
The Canterbury District Memorial Hospital
The Eastern Suburbs Hospital
The Fairfield District Hospital
The Hornsby and District Hospital
The Langton Clinic (Moore Park)
The Liverpool District Hospital
The Manly District Hospital
The Marrickville District Hospital
The Mona Vale Hospital
The Parramatta District Hospital
The Prince Henry Hospital
The Prince of Wales Hospital
The Rachel Forster Hospital'
The Royal North Shore Hospital of Sydney
The Royal South Sydney Hospital
The Ryde District Soldiers' Memorial Hospital
The St George Hospital
The Sutherland Hospital
The Sydney Hospital
The Sydney Homoeopathic Hospital
The Sydney Home Nursing Service
The Western Suburbs Hospital
The Women's Hospital (Crown Street)
The Karitane Mothercraft Society in respect of: Karitane Mothercraft Training Centre, Woollahra
The Australian Red Cross Society in respect of : Blood Transfusion Service; The Graythwaite Red Cross Home, North Sydney; Eleanor Mackinnon Junior Red Cross Home, Cronulla; The Lady Gowrie Red Cross Convalescent Home, Gordon; Berida Junior Red Cross Home; The Bodington Red Cross Hospital
The Benevolent Society of New South Wales in respect of: The Royal Hospital for Women: Scarba (Bondi)
NSW College of Nursing
New South Wales Society for Crippled Children in respect of: Margaret Reid Home, St Ives: Cleveland Hospital and Clinic for Crippled Children (Surry Hills)
Beverley Park Home, Campbelltown
The Carrington Centennial Hospital for Convalescents
The Royal Ryde Homes
Royal Society for the Welfare of Mothers and Babies in respect of: The Carpenter Mothercraft Home, Wollstonecraft; The Tresillian Homes at Petersham, Vaucluse and Willoughby
United Dental Hospital
The Adelong Hospital
The Albury Base Hospital
The Armidale and New England Hospital, Armidale
The Ballina District Hospital

The Balranald District Hospital
The Bangalow District (War Memorial) Hospital
The Barham and Koondrook Soldiers' Memorial Hospital
The Barraba Hospital
The Bateman's Bay District Hospital
The Bathurst District Hospital
The Batlow District Hospital
The Bega District Hospital
The Bellinger River District Hospital
The Berrigan War Memorial Hospital
The Bowral and District Hospital
The Bingara District Hospital
The Blacktown District Hospital
The Blayney District Hospital
The Blue Mountains District Anzac Memorial Hospital
The Boggabri District Hospital
The Bombala District Hospital
The Boorowa District Hospital
The Bourke District Hospital
The Braidwood District Hospital
The Brentwood Hospital, Muswellbrook
The Brewarrina District Hospital
The Broken Hill and District Hospital
The Bulahdelah District Hospital
The Bulli District Hospital
The Byron District Hospital
The Camden District Hospital
The Campbell Hospital, Coraki
The Canowindra Soldiers' Memorial Hospital
The Carcoar District Hospital
The Casino and District Memorial Hospital
The Cessnock District Hospital
The Cobar District Hospital
The Coffs Harbour and District Hospital
The Coledale District Hospital
The Collarenebri District Hospital
The Condobolin District Hospital
The Coolah District Hospital
The Cooma District Hospital
The Coonabarabran District Hospital
The Coonamble District Hospital
The Cootamundra District Hospital
The Corowa Hospital
The Cowra District Hospital
The Crookwell District Hospital
The Cudal War Memorial Hospital
The Culcairn District Hospital
The Delegate District Hospital
The Deniliquin Hospital
The Dorrigo Hospital
The Dubbo Base Hospital
The Dunedoo War Memorial Hospital
The Dungog and District Hospital
The Eugowra Memorial Hospital
The Finley Hospital
The Forbes District Hospital
The Gilgandra District Hospital
The Glen Innes District Hospital
The Gloucester Soldiers' Memorial Hospital
The Goodooga District Hospital
The Gosford District Hospital
The Goulburn Base Hospital,
The Governor Phillip Special Hospital (Penrith)
The Gower Wilson Memorial Hospital, Lord Howe Island
The Grafton Base Hospital
The Aruma Home (Grafton)
The Grenfell District Hospital
The Griffith Base Hospital
The Gulgong District Hospital
The Gundagai District Hospital
The Gunnedah District Hospital
The Guyra District War Memorial Hospital
The Hastings District Hospital
The Hawkesbury Benevolent Society and Hospital
The Hay Hospital
The Henty District Hospital
The Hillston District Hospital
The Holbrook District Hospital
The Inverell District Hospital
The Ivanhoe District Hospital
The Jerilderie District Hospital
The Junee District Hospital
The Kiama District Hospital
The Kyogle Memorial Hospital
The Kurri Kurri District Hospital
The Lake Cargelligo District Hospital
The Leeton District Hospital
The Lismore Base Hospital
The Lithgow District Hospital
The Lockhart and District Hospital

The McCaughey Memorial Hospital, Urana
The Macksville and District Hospital
The Maclean (Lower Clarence) Hospital
The Macleay District Hospital
The Maitland Hospital
The Manilla District Hospital
The Manning River District Hospital
The Merriwa District Hospital
The Milton-Ulladulla Hospital
The Molong District Hospital
The Moree District Hospital
The Moruya District Hospital
The Mudgee District Hospital
The Mullumbimby and District War Memorial Hospital
The Murrumburrah-Harden District Hospital
The Narrabri District Hospital
The Narrandera District Hospital
The Narromine District Hospital
The Nepean District Hospital
The Newcastle Western Suburbs Maternity Hospital
The Nimbin District Memorial Hospital
The Nyngan District Hospital
The Oberon District Hospital
The Old Folks' Home (Broken Hill)
The Orange Base Hospital
The Pambula District Hospital
The Parkes District Hospital
The Port Kembla District Hospital
The Portland District Hospital
The Prince Albert Memorial Hospital (Tenterfield)
The Queanbeyan District Hospital
The Queen Victoria Memorial Hospitals
The Quirindi District Hospital
The Royal Newcastle Hospital
The Rylstone District Hospital
The Scott Memorial Hospital (Scone)
The Shoal haven District Memorial Hospital
The Singleton District Hospital
The Tamworth Base Hospital
The Temora and District Hospital
The Tibooburra District Hospital
The Tingha District Hospital
The Tocumwal Hospital
The Tottenham Hospital
The Trangie Hospital
The Tullamore District Hospital
The Tumbarumba District Hospital
The Tumut and District Hospital
The Tweed District Hospital
The Urbenville and District Hospital
The Ungarie District Hospital
The Vegetable Creek Hospital
The Wagga Wagga Base Hospital
The Walcha District Hospital
The Wallsend District Hospital
The Walgett District Hospital
The Warialda District Hospital
The Warren District Hospital
The Wauchope District Memorial Hospital
The Wee Waa District Hospital
The Wellington District Hospital
The Wentworth District Hospital
The Werris Creek District Hospital
The Wilcannia and District Hospital
The Wilson Memorial Hospital (Murrurundi)
The Wingham and District War Memorial Hospital
The Wollongong Hospital
The Wyalong and District Hospital
The Yass District Hospital
The Yeoval Hospital
The Young District Hospital
The Royal Prince Alfred Hospital
The Royal Alexandra Hospital for Children
Chatswood District Community Hospital
Public Transport Commission of New South Wales
New South Wales Ambulance Board
Zoological Parks Board of New South Wales
Health Commission of New South Wales
Dairy Industry of New South Wales
Sydney Cove Redevelopment Authority
New South Wales Planning and Environment Commission
Metropolitan Waste Disposal Authority (Waste Recycling and Processing Service of NSW)

Totalizer Agency Board of New South Wales
New South Wales Retirement Board
Transport Retirement Board
New South Wales Fish Marketing Authority
Greyhound Racing Control Board
New South Wales Film Corporation
New South Wales Hospitals Planning Advisory Centre
Trotting Authority of New South Wales
Westmead Centre of the Parramatta Hospitals
Sydney Farm Produce Authority Market
Public Authorities Superannuation Board (State Authorities Superannuation Board)
Independent Commission Against Corruption
Judicial Commission of New South Wales
ACT Electricity and Water Authority
Community Welfare Corporation
Home Care Service of New South Wales
New South Wales Lotteries
Government Pricing Tribunal of New South Wales

Services for former electricity distributors recognised for extended leave purposes

Broken Hill Electricity
Central West Electricity
Illawarra Electricity
Monaro Electricity
Murray River Electricity
Murrumbidgee Electricity
Namoi Valley Electricity
New England Electricity
North West Electricity
Northern Riverina Electricity
Northern Rivers Electricity
NorthPower
Ophir Electricity
P-CCC Electricity
Prospect Electricity
Shortland Electricity
South West Slopes Electricity
Southern Mitchell Electricity
Southern Riverina Electricity
Southern Tablelands Electricity
Tumut River Electricity
Ulan Electricity
Western Power

Organisations recognised for extended leave purposes under the State-Owned Corporations Act

Energy South
Far West Energy
First State Power
Macquarie Generation
MetNorth Energy
MetSouth Energy
MidState Energy
NorthPower

THE TREASURER OF THE STATE OF NEW SOUTH WALES
(Treasurer)

and

ENERGY INDUSTRIES SUPERANNUATION SCHEME PTY LTD
(Trustee)

ENERGY INDUSTRIES SUPERANNUATION SCHEME TRUST DEED CONSOLIDATION AS AT 20 August 2011

Original Deed dated 30 June 1997
This Consolidation encompasses the following amendments:
Amendment No. 1 dated 27 April 1998
Amendment 2 dated 20 October 2000 *(amended Schedules only)*
Amendment 3 dated 11 January 1999 *(added Schedule 6 only)*
Amendment 4 dated 30 June 1999
Amendment 5 dated 30 June 1999 *(amended Schedules only)*
Amendment 6 dated 1 October 1999
Amendment 7 dated 4 May 2000
Amendment 8 dated 14 August 2000
Amendment 9 dated 28 March 2001
Amendment 10 dated 21 November 2000
Amendment 11 dated 28 September 2000
Amendment 12 dated 30 April 2001
Amendment 13 dated 29 March 2001
Amendment 14 dated 20 September 2002
Amendment 15 dated 8 September 2002
Amendment 16 dated 25 October 2002
Amendment 17 dated 22 November 2002
Amendment 18 dated 5 February 2003
Amendment 18A dated 17 July 2003
Amendment 19 dated 5 September 2003
Amendment 20 dated 1 June 2003
Amendment 21 dated 21 November 2003
Amendment 22 dated 24 September 2004
Amendment 23 dated 18 February 2005
Amendment 24 dated 21 September 2005
Amendment 25 dated 22 June 2007
Amendment 26 dated 28 March 2008
Amendment 27 dated 22 March 2010
Amendment 28 dated 19 March 2009
Amendment 29 dated 11 March 2011

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ENERGY INDUSTRIES SUPERANNUATION SCHEME

DEED dated 1997 by:

1. **THE TREASURER OF THE STATE OF NEW SOUTH WALES** ***(Treasurer)***

2. **ENERGY INDUSTRIES SUPERANNUATION SCHEME PTY LTD (ACN 077 947 285)** of Level 12, 83 Clarence Street, Sydney, NSW 2000 ***(Trustee).***

RECITALS:

A. The New South Wales Parliament has enacted the Superannuation Administration Act 1996 ***(Administration Act).***

B. Under the Administration Act, the Minister (being the Treasurer) may approve the preparation of a trust deed providing for a superannuation scheme for the benefit of state public sector employees, or a class or classes of state public sector employees (including employees of a local authority or a public authority) or other employees, or a class or classes of other employees, of employers under FTC or STC schemes (being employees associated with or involved in local government or local government activities, or associated with or involved in the electricity industry). Before approving the preparation of the trust deed the Minister must consult with the Labor Council of New South Wales.

C. The Minister has consulted with the Labor Council of New South Wales and has approved the preparation of a trust deed providing for a superannuation scheme for the benefit of certain employees employed in the local government sector and regulations have been made under section 128 of the Administration Act for that purpose.

D. The Minister has determined to appoint the Trustee as trustee of the superannuation scheme to be established by this Deed and to be known as the Energy Industries Superannuation Scheme and the Trustee has consented to that appointment.

IT IS DECLARED as follows.

1. INTERPRETATION

1.1 Definitions

In this Deed and Rules, unless the contrary intention appears:

Accounts means one or more accounts established and maintained by the Trustee in accordance with this Deed whether such account is referred to as an account or a reserve;

Actuary means an actuary appointed by the Trustee under sub-clause 6.5;

Administration Act means the Superannuation Administration Act 1996;

Adjustment Amounts means;

(a) estimated costs and expenses of realising the investments of the Division;

(b) allowances for future losses in respect of any investment for which the market value cannot be fairly or accurately assessed;

(c) allowance for the averaging of the earnings of the Division whether on income or capital account, to take into account possible or actual periodic fluctuations in those earnings and any losses of the Division not otherwise deducted; and

(d) allowances for any other purpose or purposes that the Trustee considers desirable or necessary;

[inserted by Deed of Amendment No.[26] operative 01/07/07]

Application Price means the price per unit calculated in accordance with Clause 3.4A.8;

[inserted by Deed of Amendment No.[26] operative 01/07/07]

Appointed Day means the date of commencement of the *Superannuation Administration (Electricity Superannuation Scheme Transitional Provisions) Amendment Regulation 1999.*

[inserted by Deed of Amendment No.6 operative 1/10/99]

Auditor means the Auditor-General of New South Wales for the 1997-1998 financial year ending 30 June 1998, and, for subsequent financial years means, an approved auditor appointed by the Trustee;

Basic Death or Invalidity Benefit has the same meaning as it has in rule 1.1 of Division A;

[inserted by Deed of Amendment No.18A operative 17/7/03]

Basic Death Invalidity Premium has the same meaning as it has in rule 1.1 of Division A;

[inserted by Deed of Amendment No.18A operative 17/7/03]

Basic Death or Temporary Salary Continuance Benefit has the same meaning as it has in rule 1.1 of Division N;

[inserted by Deed of Amendment No.18A operative 17/7/03]

Basic Death or Temporary Salary Continuance Premium has the same meaning as it has in rule 1.1 of Division N;

[inserted by Deed of Amendment No.18A operative 17/7/03]

Beneficiary means a Member, Deferred or Preserved Member, Pensioner or any other person who is a transferred member under the Transfer Regulation;

Benefit means any amount payable or which may become payable to or in respect of a Beneficiary from the Fund;

Benefit Account means one or more accounts in respect of an Employer or Beneficiary established and maintained by the Trustee in accordance with this Deed;

Binding Nominations means the nomination made by the Member under clause 14.17A.1;
[inserted by Deed of Amendment No.[24] operative 24/10/05]

Connell Wagner means Connell Wagner Pty Limited, its administrators, successors and permitted assigns;
[inserted by Deed of Amendment No.18 operative 5/2/03]

Connell Wagner Reserve means the reserve containing the following amounts:
[inserted by Deed of Amendment No.18 operative 5/2/03]

(a) the Employer reserve for Connell Wagner consisting of the following amounts;
- the Connell Wagner reserve created under Rule 2.4 of Division B;
- the Connell Wagner reserve created under Rule 2.2 of Division C;
- the Connell Wagner reserve created under Rule 2.4 of Division D;

(b) a Contributor reserve consisting of that part of the Contributors Reserve in Division D that is attributable to Contributors who are or were employees of Connell Wagner (other than such amounts transferred to a non Connell Wagner reserve);

Contribution means any amount paid to the Fund by or on behalf of an Employer or a Member and includes any amount transferred to the Fund in respect of a Beneficiary;

Custodian Trustee means a custodian which satisfies the requirements of Superannuation Law;

Death, Invalidity, and Temporary Salary Continuance Benefit Management Reserve means the Death, Invalidity and Temporary Salary Continuance Benefit Management Reserve established under this Deed;
[inserted by Deed of Amendment No.18A operative 17/7/03]

Deed means this Deed and the Rules set out in the Schedules together with any amendments made to this Deed or Rules including those effected by the establishment of a new Division of the Fund;

Deed of Adherence means the Deed of Adherence set out in Annexure B or such similar deed as the Trustee may from time to time approve;

Deferred or Preserved Member means a Member who has a Benefit which in accordance with the Rules is deferred or preserved;

Defined Benefit means a Benefit defined, wholly or in part, by reference to either or both of the following:

(a) the amount of:

(i) the Member's salary at a particular date, being the date of the termination of the Member's employment or of the Member's retirement or an earlier date; or

(ii) the Member's salary averaged over a period before retirement; or

(b) a specified amount,

but does not include such a Benefit which is only payable on the death or disability of a Beneficiary;

Dependant has the same meaning as defined in the *Superannuation Industry (Supervision) Act, 1993*;
[inserted by Deed of Amendment No.[24] operative 24/10/05]

Division means a division of the Fund established under clause 3;

Due Date means any date for payment of contributions agreed to between the Trustee and the Employer and otherwise fourteen days after the end of the month in which salary or wages the subject of contributions to the Fund were paid to the Employee;

EISS Employer means an employer responsible for making contributions for the benefit of the employee under any of Divisions B, C or D of the Fund;
[inserted by Deed of Amendment No.6 operative 1/10/99]

EISS Payment Deed means the Deed made in February 2003 between the Treasurer of New South Wales, Energy Industries Superannuation Scheme Pty Limited and Connell Wagner Pty Limited whereby the Treasurer agreed to be responsible for certain risks associated with the difference between actual investment returns of Pool B and certain assumed investment returns;
[inserted by Deed of Amendment No.18 operative 5/2/03]

Election means an election under clause 12A to exercise a Transfer Option;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Elector means a person eligible to exercise a Transfer Option under clause 12A;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Eligible Fund means a complying superannuation fund, a complying ADF or a roll-over annuity, an eligible annuity, an annuity complying with the standards prescribed under Superannuation Law or such other fund, annuity or source of payment which the Trustee determines to be a fund or body the acceptance of moneys or assets from or the payment or transfer of moneys or assets which would not in the opinion of the Trustee jeopardise the status of the Fund as a complying superannuation fund in any year of income;

Employee means a person who is an employee within the meaning of the *Superannuation Industry (Supervision) Act 1993* and is employed by an Employer or in respect of whom an Employer is required to make superannuation contributions;

Employer means any person which has been admitted to participation in the Fund as an Employer but does not include any person which has ceased to be an Employer in the Fund. When used in relation to an Employee or Beneficiary it means the Employer or former Employer of that person;

Expert Adviser means any accountant, auditor, actuary, barrister, solicitor, medical practitioner, other professional person, expert or adviser;

Family Court Order means a court order issued by the Family Court of Australia;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Family Law Act means the Family Law Act 1975 and the regulations thereunder;
[inserted by Deed of Amendment No[.21] operative 28/12/02]

Family Law Spouse Amount means the amount of the payment split determined in accordance with a Family Court order, Superannuation Agreement or Flag Lifting Agreement and the rules applying for each Division;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Flag means a 'payment flag' as defined in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Flag Lifting Agreement has the meaning ascribed to that term in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Former Funds means the STC schemes (as defined in the Administration Act) being part of the amalgamated fund as continued under the Administration Act and the FTC schemes as defined in the Administration Act;

Fund means each/both of the superannuation funds being the funds constituted by Pool A and Pool B, established by this Deed as the context requires;

Government Entity means:

(a) any government or semi-government or any government person or entity of Australia or any State or Territory of Australia; or

(b) any person or entity whose obligations are secured by a guarantee or indemnity of any person or entity specified in paragraph (a) of this definition;

GST means any goods and services tax, consumption tax, value-added tax or any similar impost or duty which is or may be levied or becomes payable in connection with the supply of goods or services;
[inserted by Deed of Amendment No.[26] operative 01/07/07]

Income Tax Acts means the Tax Act, the Income Tax Rates Act 1986 and any other Act relating to the imposition, collection and administration of Tax and any regulations made under those Acts;

Industrial Relations Commission means the Industrial Commission of New South Wales in court session;

Insured Benefit means a death or disability Benefit (or part of such a Benefit) where the entitlement to the Benefit (or part of the Benefit) is determined by the terms of an insurance policy other than an insurance policy the purpose of which is to protect the Fund or the Trustee in respect of the Fund's liability to pay a Benefit. *Insured Benefit* does not include any Benefit or part of a Benefit payable from a Benefit Account to, or in respect of, a Beneficiary on the death or disability of the Beneficiary;

Invalidity means a Member who ceases to be employed and the Trustee is satisfied that the cessation of employment is on the ground of permanent incapacity or permanent invalidity (not caused by any act or default of the Member intended to produce that incapacity or invalidity);
[inserted by Deed of Amendment No.18A operative 17/7/03]

Investment Direction means a written direction issued by a Member to the Trustee directing the Trustee as to the investment of the contributions made in respect of the Member;
[inserted by Deed of Amendment No.[26] operative 01/07/07]

LGSS means the superannuation scheme established by Deed of Settlement made on 30 June 1997 by LGSS Pty Limited and the Treasurer of New South Wales and known as the Local Government Superannuation Scheme;
[inserted by Deed of Amendment No.6 operative 1/10/99]

LGSS Employer means an employer responsible for making contributions for the benefit of the employee under any of Divisions B, C or D of the LGSS;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Mandated Contributions means:
[inserted by Deed of Amendment No.4 operative 1/7/97]

(a) contributions that reduce the employer's potential liability for superannuation guarantee charge;

(b) contributions that are payments of shortfall component;

(c) contributions required by an obligation under an agreement certified, or an award made by an industrial authority;

Member means an Employee or other person who is a member under the rules of a Division who has been accepted for membership of the Fund and who has not ceased to be a Member;
[amended by Deed of Amendment No.[1] operative 27/4/98]

Minister means the Minister responsible for the administration of the Administration Act or such other Minister determined by the Premier of New South Wales;

Net Asset Value means, at any time (as the case may be), the amount determined by the Trustee according to Australian accounting principles (as referred to in Section 272-5(2) of Schedule 2F of the Income Tax Assessment Act 1936 to be equal to the total value of the Division or the portion of the Division allocated to a Pool determined in accordance with Clause 3.4A at that time less the liabilities of the Division or Pool at that time;
[inserted by Deed of Amendment No.[26] operative 01/07/07]

Nominated Beneficiary means the legal personal representative nominated by the Member under clause 14.17A.1;
[inserted by Deed of Amendment No.[24] operative 24/10/05]

Non-Member Spouse has the meaning ascribed to that term in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Operative Time has the meaning ascribed to it in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Pensioner means a person who has become entitled to, and who has not ceased to be entitled to receive a pension under the Rules;

Police Superannuation Scheme means the superannuation Scheme established under the *Police Regulation Superannuation Act 1906*;
[inserted by Deed of Amendment No.16 operative 1/7/97]

Pool means any pool of assets referred to in Clause 3.4A.1.1;
[inserted by Deed of Amendment No.[26] operative 01/07/07]

Pool A means the pool of assets established under clause 3.4(a);

Pool B means the pool of assets established under clause 3.4(b);

Prescribed Public Sector Employer has the meaning given by the *Superannuation Administration (Electricity Superannuation Scheme Transitional Provisions) Amendment Regulation 1999*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Relevant Date has the meaning ascribed to that term in regulation 3 of the Family Law (Superannuation) Regulations 2001;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Rules means those rules governing each Division established by the Trustee under sub-clause 3.2 or 3.7 and contained in the Schedules to this Deed;

Secretary of the Fund means the person appointed to that office by the Trustee under clause 6.4;

Splittable Payment has the meaning as ascribed to that term in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

State Authorities Non-contributory Superannuation Scheme means the superannuation scheme established under the *State Authorities Non-contributory Superannuation Act 1987*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

State Authorities Superannuation Scheme means the superannuation scheme established under the *State Authorities Superannuation Act 1987*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

State Superannuation Scheme means the superannuation scheme established under the *Superannuation Act 1916*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

STC Employer means an employer responsible for making contributions under a superannuation scheme of which STC is trustee;
[inserted by Deed of Amendment No.6 operative 1/10/99]

STC Scheme means a superannuation fund or superannuation scheme established or constituted under any of the following Acts:
(a) *Superannuation Act 1916*,
(b) *State Authorities Superannuation Act 1987*,
(c) *State Authorities Non-contributory Superannuation Act 1987*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Superannuation Agreement has the meaning ascribed to that term in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Superannuation Authority means any person or body appointed under any Superannuation Law who is empowered under that legislation or some other legislation to exercise any discretion, give any consent or approval or otherwise give effect to and administer the Superannuation Law;

Superannuation Contributions Surcharge means the Superannuation Contribution Surcharge imposed under the *Superannuation Contributions Impositions Act 1997*;
[inserted by Deed of Amendment No.[1] operative 27/4/98]

Superannuation Guarantee Shortfall has the meaning ascribed to that term in the *Superannuation Guarantee (Administration) Act 1992*;

Superannuation Guarantee Charge Acts means the *Superannuation Guarantee Charge Act 1992* and the *Superannuation Guarantee (Administration) Act 1992* and any other Act relating to the imposition, collection and administration of the superannuation guarantee charge and any regulations made under the foregoing Acts;

Superannuation Interest has the meaning ascribed to that term in section 90MD of the Family Law Act;
[inserted by Deed of Amendment No.[21] operative 28/12/02]

Superannuation Law means requirements in any of the Superannuation Industry (Supervision) Act 1993, the Superannuation Entities (Taxation) Act 1993, the Tax

Act, the Superannuation Guarantee Charge Acts and regulations made under those Acts and all other requirements, whether legislative or otherwise including:

(a) any administrative guidelines issued by a Superannuation Authority; or

(b) statements by government advising changes and proposed changes to Superannuation Law,

in each case with which the Fund must comply (or which, in the reasonable opinion of the Trustee, the Fund ought comply) in order to be a complying superannuation fund;

Tax means income tax (including any tax on the disposal of assets), contributions tax, surcharge including Superannuation Contributions Surcharge, withholding tax, stamp, financial institutions and other duties, tax and other taxes, levies, imposts, deductions and charges whatsoever (including in respect of any duty imposed on receipts or liabilities of financial institutions any amounts paid in respect thereof to another financial institution) together with any interest and penalties and charges, fees or other amounts made on or in respect of them;
[amended by Deed of Amendment No.[1] operative 27/4/98]

Tax Act means the Income Tax Assessment Act 1936 and the Income Tax Assessment Act 1997;

Transfer Day means 1 July 1997;

Transfer Option means a transfer option exercised in accordance with clause 12A;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Transfer Regulation means the Superannuation Administration (Electricity Superannuation Scheme Transitional Provisions) Regulation 1997, the Superannuation Administration (Electricity Superannuation Scheme Transitional Provisions) Amendment Regulation 1997 and any other Regulation made under section 128 of the Administration Act in relation to the transfer of employers or members to this Fund;

Transfer Regulation means:

(a) *Superannuation Administration (Electricity Superannuation Scheme Transitional Provisions) Regulation 1997*;

(b) *Superannuation Administration (Local Government Superannuation Scheme Transitional Provisions) Regulation 1997*;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Transferee Scheme means the superannuation scheme to which a person elects to transfer in accordance with clause 12A;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Transferor Scheme means the superannuation scheme from which a person elects to transfer in accordance with clause 12A;
[inserted by Deed of Amendment No.6 operative 1/10/99]

Trustee means the Trustee named in this Deed and any other Trustee appointed in accordance with the provisions of this Deed;

Units means a unit created under the provisions of this document;
[inserted by Deed of Amendment No.[26] operative 01/07/07]

Unit Value means the value determined in accordance with the provisions of Clause 3.4A
[inserted by Deed of Amendment No.[26] operative 01/07/07]

1.2 Definitions from Superannuation Industry (Supervision) Act

In this Deed and in any document issued by the Trustee under this Deed, unless the contrary intention appears, the following terms shall have the same meaning as they have in the Superannuation Industry (Supervision) Act 1993 and the Superannuation Industry (Supervision) Regulations and if any definition of such a term is amended that term shall have the amended meaning on and from the date that amendment takes effect unless either before or after that date the Trustee resolves to the contrary:

Annuity
APRA
approved auditor
approved deposit fund
ASIC
associate
Commissioner
compassionate grounds
condition of release
constitutional corporation
disqualified person
eligible rollover fund
investment manager
legal personal representative
preservation age
regulated superannuation fund
severe financial hardship
spouse
successor fund
Superannuation Complaints Tribunal
superannuation fund
year of income.
[amended by Deed of Amendment No.[1] operative 27/4/98; by Deed of Amendment No.7 operative 4/5/00; amended by Deed of Amendment No.[26] operative 01/07/07, amended by Deed of Amendment No.[29] operative 01/07/07]

1.3 Definitions from Tax Act

In this Deed and in any documents issued by the Trustee under this Deed, unless the contrary intention appears, the following terms shall have the same meaning as they have in the Tax Act and if any definition of such a term is amended the term shall

have the amended meaning on and from the date the amendment takes effect unless either before or after that date the Trustees resolve to the contrary:

complying ADF
complying superannuation fund
eligible annuity
employment termination payment
registered organisation
superannuation lump sum
[amended by Deed of Amendment No.[26] operative 01/07/07]

1.4 Definitions in the Regulation

In this Deed and in any document issued by the Trustee under this Deed, unless the contrary intention appears, the terms defined in the Transfer Regulation shall have the same meaning as they have in the Transfer Regulation.

1.5 Payment in respect of a Beneficiary

In this Deed, unless the contrary intention appears, a payment in respect of a Beneficiary includes a payment or transfer of assets from the Fund in satisfaction of any obligation to or in respect of a Beneficiary and, without limitation, includes a payment or transfer of assets:

(a) to or for the benefit of a Beneficiary;

(b) to or for the benefit of another person specified in the Rules applying to the Beneficiary .

1.6 Interpretation

In this Deed unless the context otherwise requires:

(a) the singular includes the plural and vice versa;

(b) a gender includes all genders;

(c) where a word or phrase is defined, its other grammatical forms have a corresponding meaning;

(d) references to a person include a corporation, a body corporate, an unincorporated body or other entity, including any Government Entity and vice versa;

(e) headings are for convenience only and shall not affect interpretation;

(f) references to any party to this Deed or any other agreement or document include the party's successors and permitted assigns;

(g) references to any agreement or document include references to such agreement or document as amended, novated, supplemented, varied or replaced from time to time except to the extent prohibited by this Deed; and

(h) references to any legislation or to any provision of any legislation include any modification or re-enactment of it, any legislative provision substituted for it, and all regulations and statutory instruments under it.

2. DUTY TO ELECT

The Trustee shall elect that from the Transfer Day the Fund shall be a regulated superannuation fund and any election made under this clause may not be revoked.

3. THE FUND

3.1 Establishment of the Fund

On the date of this Deed, the Treasurer appoints the Trustee as trustee of the Fund and for that purpose settles the amount of $2 on the Fund to be held on behalf of the Minister and for $1 to be applied to Pool A and $1 to be applied to Pool B as a Contribution to each Pool upon the Trustee electing that the Fund become a regulated superannuation fund. On that election the Fund is established as a superannuation fund which is:

(a) intended to be a complying superannuation fund; and

(b) established for the purpose of providing superannuation benefits to or in respect of Beneficiaries on their retirement, death, disablement or on reaching a particular age or for any other purpose which may be permitted under Superannuation Law.

The Trustee shall hold the assets, including all contributions or other moneys paid or payable to the Trustee in respect of Pool A and of Pool B in trust for the persons who are or will be entitled to Benefits under the Divisions of the Fund to which each Pool relates.

3.2 Initial divisions

As at the Transfer Day five Divisions are established, and:

(a) Division A has the Rules set out in Schedule 1 to this Deed;

(b) Division B has the Rules set out in Schedule 2 to this Deed;

(c) Division C has the Rules set out in Schedule 3 to this Deed;

(d) Division D has the Rules set out in Schedule 4 to this Deed; and

(e) Division E has the Rules set out in Schedule S to this Deed.

3.3 Transferred Employers and Members

Each Division has the Employers and Beneficiaries being the transferred employers and the transferred members specified in the Transfer Regulation on and from the date they are transferred to the Fund under the Transfer Regulation. The Trustee may treat a Beneficiary as not having been transferred to the Fund or as having been transferred to the Fund if clause 14 of the Transfer Regulation which takes effect on 1 July 1997 applies and may do such things as may be necessary or convenient to give effect to that Transfer Regulation. In addition any Beneficiary incorrectly allocated to a particular Division may be allocated to the correct Division.

The Trustee shall give effect to the Transfer Regulation which takes effect on 1 July 1997 and the transfer agreement referred to in clause 16 of the Transfer Regulation.

3.4 Assets of the Fund

As at the Transfer Day, the Trustee shall establish two pools of assets within the Fund:

(a) Pool A, which shall comprise the assets held by the Trustee for the purpose of providing the benefits specified in the Rules of Division A and Division E; and

(b) Pool B, which shall comprise the assets held by the Trustee for the purpose of providing the benefits specified in the Rules of Divisions B to D inclusive.

3.4A Units
[inserted by Deed of Amendment No.[26] operative 01/07/07]

3.4A.1.1 The Trustee may (but need not do so) divide the interest in Pool A and/or Pool B into a separate class or separate classes of Units. If the Trustee does so divide the interest in Pool A and/or Pool B then the provisions of this Clause 3.4A.1 shall apply accordingly.

3.4A.1.2 All Units of a class of Units shall rank pari passu with all other Units of the Pool and each Unit of a class shall;

(a) represent an undivided interest in the Pool referable to that class of Units in the Division that shall be equal to that conferred by every other Unit of that class; and

(b) have an equal Unit Value to each other Unit of that class.

3.4A.1.3 The Trustee shall not issue any certificates for Units.

3.4A.2 Investment policy for pools

3.4A.2.1 Subject to clause 3.6, the general investment policy of each Pool shall be determined by the Trustee. The Trustee may at any time alter any general investment policy for any Pool.

3.4A.3 Segregation of assets

3.4A.3.1 Every asset shall be allocated to one or more of the Pools constituted pursuant to this Deed, provided that the Trustee may maintain and operate a payments Account for the Division as a whole, and shall maintain in that account the amount of cash which constitutes an asset of each Pool.

3.4A.4 Liabilities

3.4A.4.1 All assets of the Division shall be available to meet any liability of the Division. A Pool is not a separate trust.

3.4A.4.2 Subject to clause 3.6, the Trustee may allocate and designate the liabilities in whole or in part to any Pool as liabilities referable to that Pool. The cost of any asset may be paid by the Trustee out of the Division and shall be allocated by the Trustee as a Unit liability to the Pool to which the asset was or is to be allocated as a Unit asset.

3.4A.4.3 Subject to clause 3.6, any liability not specifically allocated and designated to a Pool may be apportioned by the Trustee between Pools as the Trustee determines provided that at all times the liabilities shall be fully allocated between Pools.

3.4A.5 Deductions from member accounts

3.4A.5.1 The Trustee may allocate to Member Accounts and discharge, whether by way of deduction from contributions or redemption of Units, the following liabilities relating to a Member;

(a) any amounts payable for the benefit of any cover under any insurance policy;

(b) any fees and charges pursuant to this document;

(c) any tax;

(d) any costs and disbursements relating more particularly to the Member than the Scheme as a whole; and

(e) any Adjustment Amount arising from the Units held by that Member (including any contingent liability not satisfied from the relevant Pool).

3.4A.6 Creation of units

3.4A.6.1 When contributions are applied for the creation of Units in a class of Units, the contribution shall be applied to the Pool referable to that class of Units and additional Units of the same class shall be thereby created.

3.4A.7 Number of units

3.4A.7.1 The number of additional Units of a class that are created shall be that number determined by dividing the amount or value of the contributions applied for Units of the class by the Application Price of the Units of that class at that time.

3.4A.8 Application price

3.4A.8.1 For the purpose of this subclause the Application Price of Units shall be the aggregate of:

(a) the Unit Value of the Units as last declared by the Trustee on or prior to the day the Units are deemed to be created; and

(b) any transaction cost not taken into account in determining Net Asset Value which in the opinion of the Trustee may be payable on or in respect of a contribution or the creation or issue of Units or the conversion of contributions to investments including any stamp duty, receipt duty, transaction tax, GST or any other tax, impost and any costs, fees, brokerage or commissions,

and the Application Price of a Unit may be rounded down to the fourth decimal point of a cent as determined by the Trustee.

3.4A.9 Valuation of contributions made by transfer of investments

3.4A.9.1 Where the Trustee agrees to accept investments as contributions then for the purpose of determining the number of Units to be created the value of the investment shall be ascertained at the date of the creation of Units in respect of the contribution using the same method of valuation as prescribed in this Deed for such investments and after deduction any transaction costs and taxes which may become payable in respect of the acquisition by the Division of the investments.

3.4A.10 Time of creation of units

3.4A.10.1 If the Trustee accepts a contribution, then the Units so applied for shall be deemed to be created on the next business day or such other time as is determined by the Trustee.

3.4A.11 Payment out of contributions account

3.4A.11.1 Upon acceptance of a contribution:

(a) if the Trustee has deposited the moneys relating to that contribution into the payments Account, those moneys shall be withdrawn from the payments Account;

(b) the moneys relating to that contribution (less any fees and charges and taxes relating to the contribution) and any premiums for insurance benefits will be an asset of the Division and shall be applied to that Pool or Pools referable to the class or classes of Units for which the contribution is to be applied in accordance with Investment Directions.

3.4A.12 Inadequate Direction from Member

3.4A.12.1 In default of any Investment Direction or in default of any direction which the Trustee considers suitable, or where the amount is less than the minimum amount required for a valid Investment Direction, the Trustee may apply contributions as it in its absolute discretion determines.

3.4A.12.2 The Trustee may in its discretion refuse to comply with any Investment Direction which the Trustee considers invalid and in such case invest in accordance with the default strategy in respect of the Investment of that Member's interest in the Division.

3.4A.13 Rebalancing

3.4A.13.1 Where a Member gives an Investment Direction which requires allocation of contributions between Pools, that Investment Direction shall be deemed to apply in respect of each contribution received during any year (or such lesser period as the Trustee determines), notwithstanding that the proportions of Units held by the Member may vary by reference to changes in the Unit Value of Units in any Pool during that period.

3.4A.13.2 The Trustee may reapply the Investment Direction as at the end of each such period to ensure that the Units held in a Member Account comply with the proportion required by the Investment Direction and the Trustee shall be entitled to redeem any Units in a Pool and apply for any Units in another Pool then required by the Investment Direction.

3.4A.14 Minimum Amounts

3.4A.14.1 Subject to Superannuation Law the Trustee may from time to time specify:

(a) the minimum amount which the Trustee will invest in Units in accordance with an Investment Direction;

(b) the minimum number of Units which a Member may acquire pursuant to an Investment Direction or may hold as a result of giving effect to an Investment Direction; or

(c) the minimum amount to be credited to a Member Account before the Trustee will give effect to an Investment Direction.

3.4A.15 Request to pay a Benefit

3.4A.15.1 The Trustee shall, subject to the provisions of this Deed, upon a Benefit becoming payable cause the redemption of the Units which relate to such Benefit.

3.4A.16 Trustee entitlement to redemption

3.4A.16.1 Where under this Deed the Trustee becomes entitled to redeem Units then such entitlement to redeem Units shall be deemed to be a notice of redemption given by the Trustee for the purpose of this Deed.

3.4A.17 Calculation and payment

3.4A.17.1 On receipt of a request for payment, the Trustee shall in respect of each Unit referable to the request for payment calculate the amount equal to the aggregate of the Unit Value of each Unit the subject of the request for payment as next declared by the Trustee after the business day on which the request for payment is taken to be

received by or given by the Trustee or on such other date as reasonably determined by the Trustee.

3.4A.17.2 The redemption price of a Unit shall be an amount determined by the Trustee from time to time by dividing the sum of the Net Asset Value of the Pool to which that class of Units are allocated. From the amount so calculated will be adjusted as follows:

(a) By an amount to allow for any transaction cost not taken into account in determining Net Asset Value which in the opinion of the Trustee may be payable on or in respect of a contribution or the creation or issue of Units or the conversion of contributions to investments including any stamp duty, receipt duty, transaction tax, GST or any other tax, or impost and any costs, fees, brokerage or commissions;

(b) by an amount to round to the nearest fourth decimal place of $1.00 (or by such other amounts determined by the Trustee).

3.4A.17.3 The Trustee shall pay to the person entitled to receive the proceeds of the redemption calculated in accordance with this subclause.

3.4A.17.4 Unless otherwise agreed with the Member, the Trustee may select what class of Units are redeemed in order to meet any payment of a Benefit, premiums payable in respect of any insurance benefit, costs and disbursements, fees and charges or tax.

3.4A.18 Cancellation of Units

3.4A.18.1 The Units the subject of a notice of redemption shall be cancelled on the date on which the Trustee makes the redemption calculation.

3.4A.19 Request to Switch

3.4A.19.1 A member may request on a quarterly basis or such more frequent basis as the Trustee permits in such form as is determined from time to time by the Trustee that Units of one class held by the Member, be converted into Units of another class. The provisions as to redemption shall apply as if that request was a request for redemption of Units.

3.4A.19.2 For the purpose of such switching the Trustee may establish procedures as to the basis upon which the Trustee will accept any such request and as to the time or intervals on which such request shall be processed.

3.4A.20 Number of Units to be Redeemed

3.4A.20.1 In calculating the number of Units to be converted pursuant to a request under this subclause, the amount shall be the aggregate of the Unit Value of each Unit the subject of the conversion request as next declared by the Trustee after the business day on which the request is received and accepted by the Trustee, and the amount payable shall not be paid to the Member but shall be applied by the Trustee on behalf of the Member in the purchase of Units of the class specified in the request at a price calculated as if it were a request for a payment of a benefit. The Trustee may waive

the deduction or addition of the transactions costs, if appropriate, having regard to the number and type of Units subject to the switch.

3.4A.21 Date of Redemption

3.4A.21.1 the redemption of the Units shall be effected on the day on which the redemption amount is calculated.

3.4A.22 Valuation of Units

3.4A.22.1 The Trustee shall ascertain the Net Asset Value of Units of each Pool at least weekly on a day of the week determined by the Trustee or the immediately preceding business day if that day is not a business day and at any other time in each month as the Trustee in its discretion may select (including on a daily basis).

3.4A.22.2 For the purposes of any valuation of the Net Asset Value of Unit assets where any Unit assets are valued by reference to a day or date then that day or date may be any period of 24 hours approved by the Trustee. For the purpose of calculating the number of business days after the 24 hour period, the 24 hour period shall be deemed to be the day or date on which the period commences.

3.5 Transfer of Assets

On or after the Transfer Day, the Trustee shall accept into the Fund from the Former Funds the assets referred to in the Transfer Regulation which takes effect on 1 July 1997 (and the transfer agreement made under clause 16 of that Transfer Regulation) which:

(a) in case of assets transferred from an FTC scheme the assets shall be allocated to Pool A; and

(b) in the case of assets transferred from an STC scheme being part of the amalgamated fund, the assets shall be allocated to Pool B.

The Trustee may at any time reallocate the assets allocated to a Pool to correct any misallocation occurring at the time of transfer of the assets to the Fund.

3.6 Application of Assets

The assets comprised in Pool A shall only be applied for the purpose of Division A and Division E and shall not be available to meet any liabilities in respect of Divisions B to D inclusive, and the assets comprised in Pool B shall only be applied for the purposes of Divisions B to D inclusive and shall not be available to meet any liabilities in respect of Division A or Division E.

3.6A Establishment and operation of the Connell Wagner Reserve
[inserted by Deed of Amendment No.18 operative 5/2/03]

(a) The Trustee will create an Employer reserve for Connell Wagner under rule 2.4 of Division B, rule 2.2 of Division C and rule 2.4 of Division D, determine that part of the assets (including the benefit of the EISS Payment

Deed) in the Employee Reserve that are attributable to Connell Wagner, determine that part of the Contributors Reserve in Division D that is attributable to Contributors who are or were employees of Connell Wagner (other than such amounts transferred to a non Connell Wagner reserve) and establish the Connell Wagner Reserve in Pool B.

(b) The Connell Wagner Reserve is to be kept separate from all other reserves and the assets comprised in the Connell Wagner Reserve are available to be applied for the purposes of paying Benefits to Members or Contributors of Pool B who have accrued benefits in Pool B because of employment by Connell Wagner and will not be available to meet any liabilities in respect of benefits payable to other Contributors or Members of Pool B.

(c) If any Member or Contributor of Pool B employed by Connell Wagner ceases employment with Connell Wagner and commences employment with another Employer, the Member's share of the Connell Wagner Reserve will be transferred to such other reserves of the Pool B as is appropriate and the Member will cease to have any right to payment out of the Connell Wagner Reserve.

(d) The Benefits of Members or Contributors whose entitlements are payable out of the Connell Wagner Reserve may not be increased without the written consent of Connell Wagner unless such increase is required by Superannuation Law.

(e) Once there are no Members or Contributors who have any right to payment of Benefits out of the Connell Wagner Reserve, any surplus in the Connell Wagner Reserve may be applied to meet any liabilities in Pool B.

3.6B No rights to other Reserves

[inserted by Deed of Amendment No.18 operative 5/2/03]

No Benefit payable from the Connell Wagner Reserve shall be payable from any other reserve in the event that the Benefit is not paid from the Connell Wagner Reserve.

3.7 Constitution of new divisions

The Trustee may establish other Divisions of the Fund (other than a Division which is to provide Defined Benefits, which may only be established with the approval of the Minister) by executing a memorandum of commencement constituting the new Division of the Fund, containing the following particulars:

(a) the name of the Division;

(b) the Rules for that Division;

(c) the pool of assets from which benefits may be provided (and for this purpose the Trustee may create a new pool but may not without the approval of the Minister apply Pool B for this purpose);

(d) any other matters the Trustee determines,

and that memorandum of commencement shall take effect upon the date stated in the memorandum of commencement.

3.8 Beneficial interest in Division

Each Beneficiary is entitled to have the assets held in respect of the Division under which the person is a Beneficiary applied to provide the Benefit to which that person is entitled under the Rules but that shall not:

(a) entitle the Beneficiary other than as provided for in this Deed or permitted by law to:

(i) interfere with the rights or powers of the Trustee in respect of the Division or Fund;

(ii) exercise any rights, powers or privileges in respect of any assets of the Division or Fund; or

(iii) require the transfer to such Beneficiary of any assets of the Fund or held in respect of a Division; or

(b) confer any interest in any particular asset of the Fund or held in respect of a Division.

3.9 Membership of more than one Division

A Beneficiary may be a Beneficiary in more than one Division and where the Employer so requires it a Beneficiary shall be a Beneficiary of more than one Division.

3.10 Certain Divisions closed

Other than by the admission of Beneficiaries pursuant to a Transfer Regulation to:

(a) Division B;

(b) Division C; or

(c) Division D,

those Divisions shall be closed to new Beneficiaries and no new Beneficiaries shall be admitted to any of those Divisions, except that a Member under Division D who was entitled to elect under section 2C of the *State Authorities Superannuation Act 1987* to contribute to the fund established under that Act may elect to cease to be a Member under Division D and become a Member under Division B.

3.11 Closure of Division or part of Division

The Trustee may close a Division or a part of a Division and thereafter no new Beneficiaries shall be admitted to the Division. The Trustee may reopen a Division or part of the Division previously closed (other than a Division closed under clause 3.10).

3.12 Rules of initial Divisions

At the Transfer Day the Rules of:

(a) Division A are intended to reflect the rights, benefits and entitlements of transferred members under the First State Superannuation Fund established under the *First State Superannuation Act 1992;*

(b) Division B are intended to reflect the rights, benefits and entitlements of transferred members under the State Authorities Superannuation Scheme established under the *State Authorities Superannuation Act 1987* and insofar as they apply to a transferred member the provisions of the following Acts or Regulations:

(i) New South Wales Retirement Benefits Act 1972;

(ii) Local Government & Other Authorities (Superannuation) Act 1927;

(iii) Public Authorities Superannuation Act 1985;

(iv) Transport Employees Retirement Benefits Act 1967, and

(v) Part 2, 3 and 6 of the State Authorities Superannuation (Transitional Provisions) Regulations 1988.

(c) Division C are intended to reflect the rights, benefits and entitlements of transferred members under the State Authorities Non-Contributory Superannuation Scheme established under the *State Authorities Non-Contributory Superannuation Act 1987*;

(d) Division D are intended to reflect the rights, benefits and entitlements of transferred members under the State Superannuation Scheme established under the *Superannuation Act 1916*;

(e) Division E are intended to reflect the rights, benefits and entitlements of transferred members under the Public Sector Executives Superannuation Scheme established under the *Public Sector Executives Superannuation Act 1989*,

as at the time immediately before the Transfer Day, and where any person is transferred under a Transfer Regulation to the Fund after the Transfer Day then the rights, benefits and entitlements of that transferred member under the Rules shall reflect the rights, benefits and entitlements of any of the Acts or Regulations mentioned in this clause as at the date of the transfer of that transferred member.

3.13 Protection of Transferred Members

Subject to any contrary provision of the Superannuation Industry (Supervision) Act 1993, this Deed and the Rules are taken to include provisions to ensure that on the date of transfer of the transferred member, a right that a transferred member had under a scheme from which the transfer was made pursuant to the Transfer Regulation is not removed or restricted and the Trustee shall apply Deed and Rules as if any provision required to ensure this was so incorporated in the Deed and Rules.

3.14 Application of Rules

Any right, entitlement or obligation including any Benefit in respect of a transferred employer or transferred member which is granted, imposed or calculated by reference to any date or period of time shall be granted, imposed or calculated from the date or by reference to the period which that right, entitlement or obligation was granted, imposed or calculated prior to the date of transfer under the Act or Regulations which applied to that transferred employer or transferred member as if the transfer had not occurred.

3.15 No increase of rights

This Deed and the Rules are not to be taken to increase or create any rights which a transferred member or transferred employer had or did not have under a Former Scheme from which a transfer was made pursuant to the Transfer Regulation and the Trustee shall apply the Deed and Rules on that basis.

3.16 Superannuation Law to Prevail

Notwithstanding any of the provisions of this clause, the Trustee may apply and administer the Deed and Rules in a manner and to the extent that they comply with the requirements of Superannuation Law, and where Superannuation Law prohibits the doing of any act or thing or requires the doing of any act or thing then notwithstanding the requirements of the Deed or Rules the Trustee may refuse to do that act or thing or do that act or thing as the case requires.

4. THE TRUSTEE

4.1 Eligibility

The Trustee shall be a constitutional corporation.

4.2 Term of Office

The Trustee shall hold office until:

(a) it is a disqualified person or it is otherwise disqualified from that office by operation of law; or

(b) it retires from that office by giving 60 days written notice to the Minister (or such lesser period as the Minister may agree).

4.3 Retirement of Trustee

(a) If the office of Trustee becomes vacant the Minister shall by deed appoint another constitutional corporation (which shall execute that Deed) to act as Trustee in accordance with this clause within 90 days of the day on which the vacancy occurs.

(b) Upon retirement, the Trustee shall be deemed to be discharged from the trusts of this Deed and the duties and obligations of a Trustee under this Deed at the time and on the date of retirement.

(c) If the Trustee has retired from office, the Trustee shall do all such things as may be necessary to give proper effect to such retirement from office and the transfer or assignment to or otherwise the vesting of the assets of the Fund in the new Trustee.

4.4 Antecedent breach by Trustee

Nothing contained in this Deed shall relieve a constitutional corporation which ceases to be Trustee from liability for any antecedent breach of trust for which it would otherwise be liable.

4.5 Remuneration

The Trustee may be reimbursed from the Fund for remuneration paid by the Trustee to a director of the Trustee, for an amount not exceeding:

(a) the maximum payable to directors or members of Governing Boards (Category B) within the appropriate Band as set out in Memorandum (Memorandum to all Ministers) No.93-43 issued by the Premier on 24 December 1993 and the attached Guidelines, as amended, by Memorandum (Memorandum to all Ministers) No.95-30 issued by the Premier on 25 August 1995 and as amended by any subsequent Memorandum or direction by the Premier; or

(b) an amount approved by the Minister.

The Trustee may be reimbursed from the Fund for all reasonable expenses incurred by it in carrying out its duties in relation to the Fund.

5. PROCEEDINGS OF TRUSTEE

A Trustee may act by resolution of its board of directors or by any person appointed for the purpose by resolution of its directors, whether or not the exercise of a discretion is involved.

6. POWERS AND DUTIES OF THE TRUSTEE

6.1 General powers

Subject to this Deed and Superannuation Law, the Trustee shall have power to do all acts and things which it considers necessary, desirable or expedient for the administration, maintenance and preservation of the Fund or any part of it. In the exercise and performance of its powers and obligations under this Deed, and without limitation, the Trustee may:

(a) provide receipts, releases or discharges for money or other assets payable or transferable to the Fund or for claims by or against the Fund;

(b) open and operate on bank accounts or accounts with cash management trusts or other financial institutions as it thinks fit and all cheques and other negotiable instruments and all receipts for money paid to the Fund shall be signed, drawn, accepted and endorsed or otherwise executed in such manner as the Trustee thinks fit;

(c) enter into all contracts, deeds and documents and do all acts and things which it considers necessary or desirable for the purpose of carrying out the trusts of this Deed;

(d) settle, compromise or submit to arbitration any claims or matters relating to this Deed, the Fund or the rights of any Beneficiary or other person claiming to have rights;

(e) commence, carry on or defend any proceedings in relation to this Deed, the Fund or any Beneficiary or any other person making any claim in respect of the Fund or any entitlement under it;

(f) effect or acquire policies of insurance of any kind on or relating to any risk, contingencies, liabilities of the Fund or the life or lives of any person or otherwise to insure the payment of the Benefits or any part thereof payable under this Deed;

(g) pay all insurance premiums, rates, Taxes, rents and other outgoings in connection with any real or personal property included in the Fund or any expenses of or incidental to the management or administration of the Fund;

(h) accept and receive as part of the Fund any property whether real or personal which may be conveyed, transferred, paid and accepted by the Trustee by way of addition or accretion to the Fund;

(i) instruct, at the expense of the Fund, and act upon the advice of, any Expert Adviser whether or not their advice was obtained by the Trustee;

(j) authorise one or more persons to exercise all or any of its powers and duties;

(k) make rules and adopt procedures in relation to determining when a member ceases to be employed by an Employer, the calculation and rounding off of

Contributions, Benefits, amounts debited or credited to any account, the valuation of assets or any other matters as shall be necessary or convenient for the Fund;

(l) subject to Superannuation Law, borrow moneys from any person, firm or company upon such terms and conditions and upon giving such security as the Trustee in its absolute discretion may determine and invest any moneys so borrowed as part of the Fund and to mortgage, charge or encumber the whole or any part of the trust property from time to time to secure repayment of the moneys borrowed and interest on those borrowings;

(m) employ managers, servants, agents and contractors irrespective of whether such person has any beneficial interest, whether direct or indirect, in the Fund or any parts thereof and to pay out of the Fund any person or persons to do any act or acts (including the receipt of money) in connection with or arising out of the exercise of the powers under this deed and including, without limitation, acts which the Trustee could perform personally;

(n) delegate to any person, firm or corporation, including any firm or corporation in which the Trustee may be interested, any of its discretions, powers and authorities including the receipt or payment of money for such period and subject to such conditions or restrictions as the Trustee shall in its absolute discretion deem fit and to pay to any such person out of the Fund all proper fees, charges, commissions and disbursements;

(o) appoint by deed or otherwise any person to act as its attorney in any place in the world, to do any acts in connection with or arising out of the exercise of the trusts, powers and discretions under this Deed and in relation to all or any part of the Fund in the same manner as the Trustee could do personally. Such attorney may be given such ancillary powers and be subject to such provisions and restrictions as the Trustee thinks fit including a power to appoint substitutes. The Trustee shall not by reason only of having made the appointment be responsible for any loss arising thereby;

(p) take on lease or hire and make improvements to any real or personal property on such terms and conditions as the Trustee shall in its absolute discretion determine;

(q) deduct and pay as required all taxes, charges and levies payable on contributions made to the Fund and on benefits payable from the Fund and to charge for the costs and expenses directly or indirectly attributable to administering such tax, charge or levy;

(r) to the extent permitted by the Administration Act and Superannuation Law, where appropriate, to charge fees for the provision of information required to be provided under Superannuation Law; and

(s) incur expenses or other liabilities jointly in respect of Pool A and Pool B and allocate those expenses and liabilities equitably between each of the Pools.

6.2 Investment powers
[amended by Deed of Amendment No.[22] operative 1/11/03]

Subject to Superannuation Law, the Trustee shall invest the Fund on an arm's length basis, but otherwise in such manner as it shall in its absolute discretion determine. Despite any statutory provisions or any rule of law or equity to the contrary and in addition to all other powers conferred on it under this Deed, by statute or rule of law or equity, the Trustee has full and absolute powers of investing and transposing moneys and buying, selling or otherwise acquiring or dealing with property (both real and personal) and varying all or any part of the investments of the Fund from time to time in all respects as if it were the absolute owner of and beneficially entitled to those investments. The Trustee's power to invest shall not be restricted by any legislation relating to trustee investments. Without limiting the generality of the absolute powers given to it, the Trustee shall in particular have the following powers:

(a) to invest in any investment for the time being authorised by the laws of the Commonwealth of Australia or any Australian State or Territory for the investment of trust funds;

(b) to purchase, hold, deal in, sell and mortgage shares of any description (whether fully paid or contributing) in any company or corporation whether public, private or otherwise and wherever situated, and in any security, undertaking or venture of any kind;

(c) to purchase, lease, hire or in any other way acquire any real or personal property of any nature and kind and wherever situate including without limitation, freehold, leasehold or conditionally purchased land whether such property is obtained subject to mortgage or otherwise;

(d) to purchase or in any other manner, hold, deal in, sell and mortgage units, sub-units or other interests in any unit trust or similar scheme;

(e) to invest in any mortgage or charge over land or any personal property of any kind and wherever situate;

(f) to invest in any of the public stocks or funds or government securities of any country, kingdom, republic or any state anywhere in the world;

(g) to deposit moneys with any bank or company and to place moneys on deposit fixed or on call with or without interest in any bank or public or private company anywhere in the world;

(h) to invest, enter into or deal in any derivative, futures contract, any underwriting or sub-underwriting, options, foreign currency or rights or interests in relation thereto, interest rate or currency swap contracts or other like investments, contracts or dealings;

(i) to apply the whole, or any part, of the Fund to or for the purpose of and to apply the same to commence, carry on, manage, control, direct or otherwise participate in any company, undertaking, profit making venture, or other

activity wherever situate as the Trustee in its absolute discretion may deem fit;

(j) to sell, call-in or otherwise convert any assets or investments comprised in the Fund at any time or from time to time for such consideration, on such terms and by such method as the Trustee determines and to re-invest or apply the proceeds in accordance with the trusts and discretions contained in this Deed;

(k) to invest any of the assets or moneys of the Fund in a common pool with the moneys of any other superannuation fund or other fund and to make such arrangements for determining the proportion of the investments so held which is attributable to the Fund and to such other superannuation fund or other fund as it considers just and equitable;

(l) to invest in ships, aircraft and chattels of any description and any shares or interest therein;

(m) to lend or advance money with or without security;

(n) to enter into securities lending arrangements;

(o) to invest in any reversionary or deferred property or rights of any description wheresoever situate or enforceable and whether by way of original creation or assignment or otherwise;

(p) to invest part of the Fund in assets for the purposes of capital gain only or which may be of a wasting nature;

(q) to invest or expend any part of the Fund in any annuity or policy on the life of any Beneficiary or the happening of any other event;

(r) to invest all or part of the Fund in one or more superannuation policies or pooled superannuation trusts;

(s) to draw, make, accept, endorse, discount, execute and issue promissory notes, bills of exchange, bills of lading and other negotiable or transferable instruments;

(t) to enter into bill facility or promissory note agreements; and

(u) to do any act or thing or enter any contract which the Trustee considers to be incidental to or necessary or convenient to any of the foregoing.

6.3 Investment managers and Custodian Trustees

(a) Prior to the Transfer Day, and in accordance with clause 18 of the Transfer Regulation the Trustee shall appoint Axiom Funds Management Limited as the first investment manager of the assets of Pool B.

(b) Subject to paragraph (a), Superannuation Law and the Transfer Regulation, the Trustee shall appoint one or more bodies corporate to act as investment manager and one or more bodies corporate to act as Custodian Trustee to hold on its behalf title to some or all of the assets of the Fund subject to such conditions as the Trustee determines and may delegate to and confer upon such investment manager or Custodian Trustee such powers as the Trustee may think fit.

(c) Subject to Superannuation Law, the Trustee shall not be liable or responsible for any act, omission, error of judgement, negligence or breach of trust of any such investment manager or Custodian Trustee and shall not be bound to take proceedings against any investment manager or Custodian Trustee in respect thereof.

(d) The Trustee may pay out of the Fund to any such investment manager or Custodian Trustee such remuneration for its services as the Trustee has agreed or considers proper and subject to clause 6.10 may remove such investment manager or Custodian Trustee or agree to alter the terms of its appointment as it sees fit.

(e) Any powers, discretions or authorities of the Trustee which an investment manager or Custodian Trustee is authorised to exercise may be exercised by that investment manager or Custodian Trustee alone or jointly with the Trustee as the Trustee in its discretion shall agree or determine, but in any event must be exercised on behalf of the Trustee.

6.4 Appointment of Secretary

The Trustee may appoint a Secretary of the Fund on such terms as the Trustee thinks fit and the Trustee may remove a Secretary and appoint another person as Secretary of the Fund. The Secretary shall perform the duties and have the powers set out in this Deed and such other powers and duties as the Trustee may determine from time to time.

6.5 Appointment of Actuary

The Trustee may from time to time appoint as Actuary to the Fund a person satisfying any requirements specified in Superannuation Law, on such terms as the Trustee thinks fit. The Trustee may remove any Actuary it has appointed and appoint another person as Actuary to the Fund. The Trustee may instruct the Actuary to perform such actuarial investigations in relation to the Fund or any Division as it considers necessary or desirable.

6.6 Appointment of Administrator

Subject to paragraph (a), Superannuation Law and the Regulation:

(a) Prior to the Transfer Day, the Trustee shall appoint the Superannuation Administration Authority as the first administrator of the Fund, in accordance with clause 17 of the Regulation.

(b) Subject to paragraph (a), the Trustee may appoint in writing, on such terms as it thinks fit, including the granting of any indemnity reasonably required, one or more bodies corporate to act on behalf of the Trustee in the administration of the Fund.

(c) Subject to Superannuation Law, the Trustee shall not be liable or responsible for any act, error, omission, error of judgment, negligence or breach of trust of any such administrator of the Fund and shall not be bound to take proceedings against any administrator in respect thereof.

(d) The Trustee may pay out of the Fund to any administrator such remuneration for its services as the Trustee has agreed or considers proper and subject to clause 6.10 may remove such administrator or agree to alter the terms of its appointment as it sees fit.

(e) Any powers, discretions or authorities of the Trustee which an administrator is authorised to exercise may be exercised by that administrator alone or jointly with the Trustee as the Trustee in its discretion shall agree or determine, but in any event, must be exercised on behalf of the Trustee.

6.7 Expenses

The Trustee shall pay out of the Pool B all expenses of or incidental to the establishment of the Fund. The Trustee shall pay out of the Fund all expenses of and incidental to the management and administration of the Fund, including any insurance premiums in relation to the Fund or the directors of the Trustee in the discharge of their duties as directors of the Trustee and shall allocate those payments as between Pool A and Pool B in a fair and equitable manner as determined by the Trustee.

6.8 Superannuation Law

The Trustee may do all things considered by it as necessary or convenient to comply with any provision of Superannuation Law and without limitation the Trustee may:

(a) require Employers, Beneficiaries, dependants of Beneficiaries or other persons entitled to a Benefit or making Contributions to the Fund to provide such information as the Trustee may require in order to satisfy it that any provision of Superannuation Law or this Fund is complied with, to determine whether any Tax is payable or to calculate any Benefit;

(b) refuse to accept any Contribution or refuse to pay any Benefit to any person where acceptance of the Contribution or the payment of the Benefit may in the reasonable opinion of the Trustee result in the Fund ceasing to be a complying superannuation fund or where information sought under paragraph (a) has not been provided; and

(c) lodge any returns or other documents required by Superannuation Law, make objection to any assessment or seek review of any determination of any Superannuation Authority or to pursue any objection or review by way of legal or other proceedings.

6.9 Regulation and Transfer Agreement

(a) The Trustee shall do all things considered by it as necessary or convenient to comply with any provision of the Transfer Regulation and without limitation the Trustee shall do all things required to be done by it by the Transfer Regulation.

(b) On or before the Transfer Date the Trustee shall enter a transfer agreement as required by clause 16 of the Transfer Regulation to deal with the transfer of transferred employers, transferred members and assets and the costs of the transfer and the establishment of this Fund with the STC and the FTC and shall give effect to that transfer agreement.

6.10 Minister's Consent

The Trustee may not without the Minister's consent:

(a) terminate any investment management agreement entered into pursuant to the Transfer Regulation or clause 6.3(a); or

(b) terminate any administration agreement entered into pursuant to the Transfer Regulation or clause 6.6(a),

prior to the end of the initial term of either agreement.

6.11 Authorisation

The Trustee may authorise one or more persons to exercise any power vested in it in such manner and upon such terms and conditions as it thinks fit including:

(a) the establishment and maintenance of any Accounts;

(b) the receipt of Contributions and the payment of Benefits;

(c) the establishment and maintenance of any records, registers or other information required to be maintained by this Deed;

(d) the power to do anything or obtain any approval that may be necessary or convenient in order to comply with Superannuation Law or the Income Tax Acts;

(e) the power to accept or reject applications by Employers or Members to join the Fund; and

(f) such other matters relating to the administration and operation of the Fund as the Trustee may determine.

6.12 Exercise of powers and discretions

The Trustee in the exercise of any power, discretion or authority under this Deed or otherwise vested in the Trustee shall have an absolute and uncontrolled discretion and may exercise or enforce all or any of those powers, discretions or authorities from time to time or at any time and may refrain from exercising any of those powers, discretions or authorities from time to time or at all.

6.13 Disputes

Subject to Superannuation Law and any Transfer Regulation if there is any dispute or difference as to the effect or interpretation of this Deed the decision of the Trustee shall be final and binding.

6.14 Accounts

Subject to Superannuation Law, the Trustee may establish and maintain such accounts within the Fund as are, in the Trustee's opinion necessary or convenient for the operation or administration of the Fund or any Division of the Fund. The Trustee may:

(a) credit to any account any amount that is required or permitted by or under the Deed or Rules to be credited to it; and

(b) debit to any account any amount that is required or permitted by or under the Deed or Rules to be debited to it,

and the Trustee may designate those accounts as Benefit Accounts, reserve accounts or by such other titles as the Trustee may determine.

6.14A. Death, Invalidity and Temporary Salary Continuance Benefit Management Reserve
[inserted by Deed of Amendment No.[18A] operative 17/7/03]

6.14A.1 The Trustee may establish and maintain a death, Invalidity and Temporary Salary Continuance Benefit Management Reserve or other equivalent reserve in respect of one or more Divisions of Pool A.

6.15 Payments of levies

The Trustee may make any levy or other payment out of the Fund as is required by Superannuation Law to be made and may allocate the levy or payment to such accounts as it determines.

6.16 Related party dealings

Subject to Superannuation Law, the Trustee may enter into any financial, banking, insurance, agency or other transaction or any contract which it is empowered to enter into under the Deed or Rules with a related body corporate on arm's length terms. The question of whether a body corporate is related to the Trustee shall be determined in accordance with the Corporations Law.

7. ACCOUNTS, AUDIT AND INFORMATION

7.1 Records and Accounts

The Trustee shall maintain or cause to be maintained proper accounts and records of the Fund and its administration as may be required by Superannuation Law or the Income Tax Acts and as the Trustee may otherwise determine.

7.2 Provision of information

Subject to sub-clause 7.7, the Trustee shall provide Employers and Beneficiaries with such information in relation to the Fund as is required by Superannuation Law or as the Trustee otherwise determines.

7.3 Annual statements

The Trustee shall prepare in respect of each year of income those accounts and financial statements required by Superannuation Law.

7.4 Audit

The Auditor for the 1997/1998 financial year ending 30 June 1998 shall be the Auditor-General of New South Wales. For subsequent financial years, the Trustee shall appoint an Auditor approved for the purposes of Superannuation Law. The Trustee shall have the Fund audited by the Auditor in each year of income.

7.5 Information to Minister

The Trustee must promptly furnish to the Minister the following information (other than to the extent the Minister waives this requirement):

(a) copies of returns to the Superannuation Authority and the annual accounts of the Fund;

(b) copies of any reports to the Auditor or Actuary;

(c) copies of any agreement with any investment manager, custodian, scheme administrator, investment adviser, other adviser or expert or any other similar agreement;

(d) copies of any correspondence to or from the Superannuation Authority (other than correspondence relating to a particular Beneficiary);

(e) any decision of the Resolution of Complaints Tribunal or of any other tribunal or court relating to the Fund; or

(f) information relating to the general administration and operation of the Fund as the Minister may from time to time require but such information should not include information relating to an individual Beneficiary without that Beneficiary's consent.

7.6 Accounts evidence payment

The accounts of the Fund shall be sufficient evidence of all payments shown in them to have been made to or for the benefit of any person. The receipt of the Trustee for any property, the payment of any moneys or for any stock, shares, funds or securities of any kind transferred to it shall effectually discharge the person or persons paying or transferring the same in respect of any such obligation and from being bound to see to the application, or being answerable for the loss or misapplication, of such property.

7.7 Confidentiality

Subject to this Deed, the Trustee shall not be required to disclose to any person other than the Minister or Employer any information relating to a present or former Employer or Beneficiary unless that disclosure:

(a) is reasonably necessary or convenient for the purpose of obtaining advice by the Trustee in relation to any matter pertaining to the Fund or is required by an insurer for the purpose of effecting or maintaining any insurance policy;

(b) is required by law;

(c) is authorised by the person in respect of whom the information relates;

(d) is to a Beneficiary or a person who has an interest in a Member's entitlement in a Division and is of information relating to that Division of the Fund of which the person is a Beneficiary or under which the Beneficiary is or was a Beneficiary so long as the information does not include information relating to Benefits of other Beneficiaries or personal information pertaining to other Beneficiaries of the Fund.

Before disclosing any information, the Trustee may require that the consent of persons about whom the information relates is obtained and that the person to whom the information is provided gives such undertakings as to the use of the information or confidentiality of the information as the Trustee may require.

8. VALUATIONS

8.1 Valuations

Unless otherwise provided in the Rules, the Trustee shall cause a valuation of all assets of the Fund to be made at least once in each year of income of the Fund and at such other dates, by such persons and using such methods as the Trustee may determine.

8.2 Excess amount

Where the value of the assets of a Pool or part of a Pool or in an account established under the Deed or Rules in respect of a particular Employer (***Employer's reserve***) is more than the value of the liabilities of the Pool, part of the Pool or supported by that Employer's reserve (as the case may be) ***(excess amount)***, the Trustee may, on the advice of the Actuary apply the excess amount to reduce Contributions otherwise

payable by an Employer or, with the consent of the Minister and on the advice of the Actuary, determine to apply all or part of the excess amount for any purpose agreed by the Trustee and the Minister and in accordance with Superannuation Law.

9. LIABILITY OF TRUSTEE

9.1 Liability for acts or omission

The Trustee shall not be liable to the Fund nor to any person whatsoever to an extent greater than the assets of the Fund.

9.2 Indemnity

Subject to Superannuation Law, the Trustee and each director of the Trustee shall be indemnified by the Fund in respect of any liability incurred while acting as the Trustee or as director of the Trustee (as the case may be) except where the liability arises from a breach of trust where the Trustee or director:

(a) fails to act honestly in a matter concerning the Fund;

(b) intentionally or recklessly fails to exercise, in relation to a matter affecting the Fund, the degree of care and diligence required to be exercised,

or the liability is for a monetary penalty under a civil penalty order imposed under Superannuation Law. The indemnity shall extend to all legal and other costs, charges and expenses of administering or winding up the Fund and otherwise of performing any trusts, powers, authorities and discretions under this Deed. The indemnity provided to the Trustee and the directors of the Trustee under this clause shall be in addition to any other indemnity allowed by law or given under this Deed.

9.3 Satisfaction of indemnity

Subject to Superannuation Law, the Trustee shall have a lien on and may dispose of all assets of the Fund in the hands of the Trustee for the purpose of the indemnity set forth in sub-clause 9.2.

9.4 Insurance

The Trustee may effect such insurance for claims against the Trustee and the Trustee's directors as it thinks fit. The cost of such insurance shall be an expense of the Fund.

9.5 Information provided to Trustee

The Trustee shall be entitled to rely upon information provided to it by an Employer or Beneficiary or any other person acting at the request of or on behalf of an Employer or Beneficiary. The Trustee shall be indemnified by the Employer or Beneficiary who provided the information or at whose request or on whose behalf the information was provided in relation to any loss, damage or expense incurred by the Trustee arising as a result of any such information proving to be incorrect or misleading.

9.6 Trustee not obliged to pay

Subject to Superannuation Law and the obligations under this Deed, except in the case of dishonesty or unless the Trustee has failed to show the degree of care and diligence required of a trustee having regard to the powers, authorities and discretions conferred on the Trustee by this Deed, in no event is the Trustee bound to make any payment to any person in connection with this Deed or the Fund or liable to any person in connection with this Deed or the Fund to any greater extent than:

(a) where the person is a Beneficiary, the assets of the pool from which that Beneficiary's Benefit is to be provided;

(b) in any other case, the assets of the Fund.

10. EMPLOYERS AND MEMBERS

10.1 Initial Employers

As at the date of transfer of a transferred member of a transferred employer, each transferred employer in the Schedule to the Transfer Regulation shall be:

(a) an Employer; and

(b) bound by the terms of this Deed.

10.2 Application to become Employer

An authority, body or other entity:

(a) referred to in or established under an Act specified in Part 1 of Annexure A to this Deed, described in Part 2 of Annexure A or to which clause 10.1 applies;

(b) which is wholly owned or controlled by a transferred employer, or an Employer previously admitted as an Employer of the Fund either under this paragraph or paragraph (a) or by any two or more of those persons; or

(c) approved, or within a class approved, by the Minister,

may make written application to the Trustee to become an Employer of the Fund in respect of some or all of its employees. The application shall be in the form and contain the information required by the Trustee. The Trustee may accept the duly executed application. On acceptance, the person shall become an Employer of the Fund in such Division or Divisions as the Trustee determines.

10.3 Deed of Adherence

As soon as practicable after the Trustee accepts an application by a person to become an Employer under clause 10.2, the applicant shall execute the Deed of Adherence. Following execution of the Deed of Adherence, this Deed becomes binding on the

person as Employer and the Employees or former Employees of that Employer who become Beneficiaries.

Notwithstanding this requirement if any person who is a transferred member or who is otherwise entitled to be an Employer, makes a contribution to the Fund in respect of a Beneficiary then that contribution may be accepted by the Trustee and upon acceptance the person so contributing shall be deemed to be an Employer and shall be bound by the terms and conditions of this Deed as if that person had executed a Deed of Adherence and that person shall on being requested to do so by the Trustee execute a Deed of Adherence.

10.4 Eligibility for membership

An Employer may by written notice to the Trustee nominate from time to time Employees whom it wishes to become Members of the Fund. The Employer shall supply to the Trustee such information relating to those Employees as the Trustee requires.

10.5 Application by Employees of an Employer

Upon being nominated by an Employer, an Employee shall, if required by the Trustee, make written application to the Trustee to become a Member in such form and providing such information as the Trustee requires. Notwithstanding that an Employee who is nominated by an Employer has not made application to the Trustee or provided the required information to the Trustee, the Employee shall become a Member of the Fund. An Employee who becomes a Member shall be admitted as a Member of the Division nominated by the Member's Employer and approved by the Trustee.

10.5A Executive Officer
[inserted by Deed of Amendment No.[1] operative 27/4/98]

An Employer may nominate an Employee as an "eligible person" for the purposes of the definition of "Executive Officer" in the Divisions and the employee will only be eligible to be nominated as such if the person satisfies the following:

(a) occupies a senior position; and

(b) is on a fixed term contract of employment.

10.6 Members bound by Deed

Every person being or becoming a Member and all persons claiming through them shall be deemed to have approved of and to be bound by the Deed and the Rules.

10.7 Ceasing to be Employee

Each Employer shall promptly give written notice to the Trustee upon a Member ceasing to be an Employee. If any Member is transferred in the Member's employment from one Employer to another Employer then for the purposes of this Fund the Member shall notwithstanding any other provision of this Deed or the Rules

be deemed not to have ceased to be an Employee unless the Trustee determines that the Member has ceased to be an Employee for the purpose of this Deed and the Rules.

10.8 Ceasing to be Beneficiary

Unless otherwise provided in the Rules, a person shall cease to be a Beneficiary of the Fund upon the earlier of:

(a) the payment of the whole of the Beneficiary's Benefit to or in respect of the Beneficiary;

(b) the transfer of the whole of the Beneficiary's Benefit to another Eligible Fund in accordance with sub-clause 12.3;

(c) the payment of part of the Beneficiary's Benefit to or in respect of a Beneficiary and the transfer of the balance of the Beneficiary's Benefit to another Eligible Fund in accordance with sub-clause 12.3;

(d) if the Beneficiary ceases to be entitled to a Benefit.

10.9 Beneficiaries to provide information
[replaced by Deed of Amendment No.[1] operative 27/4/98]

Every Beneficiary shall submit:

(a) a member application in a form approved by the Trustee (other than in the case of a person who is a transferred member under the Transfer Regulation); or

(b) the name of the person, date of birth, address, and date of commencement of employment; and

(c) if required, any evidence of health and completed and signed statements as to health required in connection with any insured benefit; and

(d) details of the persons membership of any other superannuation investment and any other information the Trustee determines to be reasonably necessary to assist in the administration of the plan or determination of the Members' Benefits.

10.10 Employers to provide information
[inserted by Deed of Amendment No.[1] operative 27/4/98]

(a) An Employer, on joining the Fund, shall supply such information concerning its Employees eligible to join the Fund as the Trustee may reasonably determine.

(b) Each Employer shall give to the Trustee clear directions as to the entitlement to contributions made by the Employer to the Fund.

11. CONTRIBUTIONS

11.1 Limit of Contributions

Employers and Members shall make contributions in accordance with this Deed, the Rules or any other arrangement agreed by the Trustee but the Trustee may refuse to accept any Contribution which may, in the opinion of the Trustee, jeopardise the status of the Fund as a complying superannuation fund.

11.2 Authority to deduct Member Contributions

Each Member authorises its Employer to deduct Contributions due by the Member (if any) from the Member's remuneration and to pay those moneys to the Fund on behalf of the Member.

11.3 Late Contributions

The Trustee may charge collection costs and interest at a reasonable rate as determined from time to time by the Trustee on any amount not paid by an Employer on or before the Due Date.

11.4 Additional Contributions

An Employer or Member may make such additional Contributions to a Division if permitted by the Rules of that Division as the Trustee may from time to time agree. Those Contributions shall be applied by the Trustee as the Employer or Member, as the case may be, directs and as agreed by the Trustee. The Trustee may require that a particular Employer shall make additional contributions in respect of some or all of its Employees or former Employees who are Beneficiaries and the Employer shall comply with that requirement.

11.5 Refund of payments

If any moneys paid to the Fund will or may jeopardise the status of the Fund as a complying superannuation fund or, in the opinion of the Trustee, have been paid by mistake (whether of law or of fact), the Trustee may refund those moneys to the person who paid them to the Fund. Subject to the Rules, the Trustee shall not be liable to pay any interest, or account for any earnings or compensate the person who paid those moneys in any way and a person shall not be deemed to have become an Employer or a Member merely by reason of the receipt by the Trustee of those moneys.

11.6 Acceptance of assets

The Trustee may agree to accept the transfer of an asset by an Employer as a Contribution to a Division of the Fund. The amount of the Contribution shall be the value of the asset to be transferred as agreed between the Trustee and the Employer, and it shall be applied by the Trustee as a Contribution by or in respect of the Member to whom it relates.

11.7 Contributions holiday

The Trustee shall determine as required by the Rules from time to time on the advice of the Actuary and in accordance with the Rules, the Contributions to be made by Employers. The Trustee may, on the advice of the Actuary and in accordance with clause 8.2, permit an Employer or class of Employers to reduce its Contributions otherwise required to be paid under the Rules in respect of all or some of the Employers' Beneficiaries for such time and subject to such conditions as the Trustee on the advice of the Actuary, determines.

11.8 Contributions Tax

If any part of the excess amount referred to in clause 8.2 is applied to reduce the Contributions otherwise payable under the Rules by an Employer, the Trustee may debit the Benefit Account of that Employer's Members by an amount equal to the Tax at the rate of Tax specified, at the time the amount is applied, as payable on those Contributions, or at such lesser rate as the Trustee on the advice of the Actuary may determine, as if it had been paid by the Employer directly to the Fund.

11.9 Surcharge

11.9.1 Where the Trustee is required to make any payment in satisfaction of any tax, surcharge, levy or other similar amount calculated by reference to the salary, income or other financial circumstances of a Beneficiary (the ***Liable Beneficiary***) the Trustee shall adjust the Benefits or Benefit Accounts of that liable beneficiary to reflect the cost to the fund of the payment made including any cost of funding that payment.
[numbering amended by Deed of Amendment No.[1] operative 27/4/98]

11.9.2 A Beneficiary may, at any time, lodge with the Trustee an election to pay amounts to the Fund in respect of the Superannuation Contributions Surcharge payable in respect of the Beneficiary and:
[inserted by Deed of Amendment No.[1] operative 27/4/98]

(a) payments may be made on a periodic or a single payment basis;

(b) an election is to specify the amounts to be paid and the manner in which payment is to be made;

(c) A Beneficiary may at any time, lodge with the Trustee an election to vary or revoke an election under the section;

(d) An election under this clause is to be in a form approved by the Trustee for the purposes of this clause;

(e) An election under this clause remains in force until a subsequent election under this clause takes effect.

12. TRANSFER TO AND FROM OTHER FUNDS

12.1 Transfer in

The Trustee may accept into any Division of the Fund which is not closed to new Members:

(a) moneys or assets from another Eligible Fund under an arrangement with the trustee, employer or member or members of that Eligible Fund where the member or members of that Eligible Fund are or propose to become Beneficiaries of the Division;

(b) a superannuation lump sum or employment termination payment of a person under an arrangement between that person and the Trustee where that person proposes to become or is a Beneficiary of the Division; or

(c) moneys or assets from another Division of the Fund where the Member or Members intend to become Beneficiaries of the Division, and the amount of the moneys or the value of the assets transferred shall be applied by the Trustee in accordance with the arrangements relating to the transfer as agreed by the Trustee, and in accordance with Superannuation Law.

[amended by Deed of Amendment No.[26] operative 01/07/07]

12.2 Non-acceptance of transfer in

The Trustee may, in its absolute discretion and without being required to give any reason, decline to accept from:

(a) another Eligible Fund, any transfer or payment of moneys;

(b) a person, any superannuation lump sum or employment termination payment; or

(c) from a Division, any transfer to another Division of the Fund which is not closed to new Members.

[amended by Deed of Amendment No.[26] operative 01/07/07]

12.3 Transfer In - Regulations

The Trustee may accept into the Fund, Beneficiaries, Employers and assets on such terms as are set out in a Transfer Regulation or any transfer agreement entered into under that Transfer Regulation.

12.4 Transfer out

In addition to any entitlement under the Rules for a Beneficiary to transfer a Benefit, where a Beneficiary (other than a Beneficiary under Division B, C, D or E) is or becomes eligible for membership of another Eligible Fund then with the consent of the Beneficiary if that consent is required by Superannuation Law, the Trustee may, subject to the Rules and such conditions as the Trustee may decide, pay all or part of a Beneficiary's Benefit to such other fund together with such other amount as the Trustee with the consent of the Employer may agree. A Member in Division B, C, D or E may request the Trustee to pay the Beneficiary's Benefit to another Eligible Fund and if the Beneficiary's Employer consents to the transfer, the Trustee may, subject to

the Rules and such other conditions as it may decide, pay the Beneficiary's Benefit to such other fund.

12.5 Receipt from trustees of another fund

Where an amount is paid to the trustees of an Eligible Fund pursuant to this clause the receipt given by the trustees of the Eligible Fund (including in the case of an annuity effected in respect of a Member, the body providing that annuity) in respect of the amount paid is a full discharge to the Trustee of all its obligations to or in respect of the Beneficiary under this Deed and the Trustee shall not be in any way responsible for or liable in respect of the application or disposal of such money by such trustee or other person.

12A MOBILITY BETWEEN SCHEMES

[clause 12A inserted by Deed of Amendment No.6 operative 1/10/99]

12A.1 Eligible Employees and Contributors

The following persons are eligible to exercise a Transfer Option:

(a) a Category 1 Elector - that is, a person who, on the Appointed Day, was a contributor to the State Superannuation Scheme or to the State Authorities Superannuation Scheme or Police Superannuation Scheme or Division B or D of the LGSS and who, in accordance with clause 12A.2, is taken to have transferred employment;
[amended by Deed of Amendment No.16 operative 1/7/97]

(b) a Category 2 Elector - a person who, on the Appointed Day, was a contributor to Division B or D of the Fund and who, in accordance with clause 12A.3, is taken to have transferred employment;

(c) a Category 3 Elector - a person who, on the Appointed Day, held deferred Benefits in both the State Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or in both Division C and D of the LGSS in relation to the same period of employment and who, in accordance with clause 12A.4, is taken to have transferred employment;

(d) a Category 4 Elector - a person who, on the Appointed Day, held deferred Benefits in both the State Authorities Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or in both Division B and C of the LGSS in relation to the same period of employment and who, in accordance with clause 12A.5, is taken to have transferred employment;

(e) a Category 5 Elector - a person who, on the Appointed Day, held deferred Benefits in each of Divisions B and C of the Fund in relation to the same period of employment and who, in accordance with clause 12A.6, is taken to have transferred employment;

(f) a Category 6 Elector - a person who, on the Appointed Day, held deferred Benefits in each of Divisions C and D of the Fund in relation to the same

period of employment and who, in accordance with clause 12A.7, is taken to have transferred employment;

12A.2 Contributors to SSS or SASS or the LGSS

A person who is a Category 1 Elector is taken to have transferred employment if:

(a) the person has ceased, on or after the Appointed Day, to be a contributor to the State Superannuation Scheme or to the State Authorities Superannuation Scheme or to the Police Superannuation Scheme, or to Division B or D of the LGSS and
[amended by Deed of Amendment No.16 operative 1/7/97]

(b) within 3 months after ceasing to be a contributor to that scheme, the person has become an employee of an EISS Employer.

12A.3 Contributors to the Fund

A person who is a Category 2 Elector is taken to have transferred employment if:

(a) the person has ceased, on or after the Appointed Day, to be a contributor to Division B or D of the Fund, and

(b) within 3 months after ceasing to be such a contributor, the person has become an employee of an STC Employer or an employee of a LGSS Employer.

12A.4 Holders of deferred Benefits in SSS and SANCSS or the LGSS

A person who is a Category 3 Elector is taken to have transferred employment if:

(a) within the Prescribed Time after the person's Benefits in the State Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or Divisions C and D of the LGSS were deferred, the person has become an employee of an EISS Employer, and

(b) the person has thereafter remained an employee of that employer, or been employed by a succession of EISS Employers or LGSS Employers or STC Employers (or any combination), with no break in service longer than the Prescribed Time.

In this subclause 12A.4, the ***Prescribed Time*** means the time allowed for the purposes of section 38C(2) of the *Superannuation Act 1916.*

12A.5 Holders of deferred Benefits in SASS and SANCSS or the LGSS

A person who is a Category 4 Elector is taken to have transferred employment if:

(a) within the Prescribed Time after the person's Benefits in the State Authorities Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or Divisions B and C of the LGSS

were deferred, the person has become an employee of an EISS Employer, and

(b) the person has thereafter remained an employee of that employer, or been employed by a succession of EISS Employers or LGSS Employers or STC Employers (or any combination), with no break in service longer than the Prescribed Time.

In this subclause 12A.5, the ***Prescribed Time*** means the time allowed for the purposes of section 30(2) of the *State Authorities Superannuation Act 1987.*

12A.6 Holders of deferred Benefits in Divisions B and C of the Fund

A person who is a Category 5 Elector is taken to have transferred employment if:

(a) within the Prescribed Time after the person's Benefits in Divisions B and C of the Fund were deferred, the person has become an employee of an STC Employer or LGSS Employer, and

(b) the person has thereafter remained an employee of that employer, or been employed by a succession of EISS Employers or LGSS Employers or STC Employers (or any combination), with no break in service longer than the Prescribed Time.

In this subclause 12A.6, the ***Prescribed Time*** means the time allowed for the purposes of section 30(2) of the *State Authorities Superannuation Act 1987.*

12A.7 Holders of deferred Benefits in Divisions C and D of Fund

A person who is a Category 6 Elector is taken to have transferred employment if:

(a) within the Prescribed Time after the person's Benefits in Divisions C and D of the Fund were deferred, the person has become an employee of an STC Employer or LGSS Employer; and

(b) the person has thereafter remained an employee of that employer, or been employed by a succession of EISS Employers or LGSS Employers or STC Employers (or any combination), with no break in service longer than the Prescribed Time.

In this subclause 12A.7, the ***Prescribed Time*** means the time allowed for the purposes of section 38C(2) of the *Superannuation Act 1916.*

12A.8 Manner and form of exercising option

An Election to exercise a Transfer Option is to be given in writing to the trustee of the Transferee Scheme, using a form approved by that Trustee.

12A.9 Provision of Information

(a) An Elector must provide such information as may be required to complete the election form, being information that the trustees of the Transferor Scheme or Transferee Scheme may reasonably require to give effect to the Election.

(b) Either trustee is entitled to require the other to provide information (including members' files) reasonably necessary to give effect to the Election.

(c) The Trustee is entitled to require an Employer, under a scheme for which it is trustee, to provide such information as may be reasonably necessary to the Trustee in order to give effect to the Election.

12A.10 Time within which option may be exercised

(a) An Election by a Category 1 or 2 Elector who, in accordance with subclause 12A.2 or 12A.3, is taken to have transferred employment must be made within 3 months after the transfer of employment.

(b) An Election by a Category 3, 4, 5 or 6 Elector who, in accordance with subclause 12A.4, 12A.5, 12A.6 or 12A.7, is taken to have transferred employment before the Appointed Day, must be made within 12 months after that day.

(c) An Election by a Category 3, 4, 5 or 6 Elector who, in accordance with subclause 12A.4, 12A.5, 12A.6 or 12A.7, is taken to have transferred employment on or after the Appointed Day, must be made within 12 months after the transfer of employment.

(d) An Election takes effect when the election form, duly completed, is received by the trustee of the Transferee Scheme.

(e) However, an Election does not take effect if an Elector has applied for a payment of a benefit (including a deferred benefit) under the Transferor Scheme before the Election is received by the trustee of the Transferee scheme.

(f) Despite any other provision in this clause, the Trustee of where the Fund is the Transferee Scheme the Trustee may allow an Elector an additional period not exceeding 12 months, in which to make an Election to transfer to the Fund if the Trustee thinks it appropriate in the circumstances.

12A.11 Amounts transferable on exercise of option

(a) On exercise by a person of a Transfer Option in which the Fund is the Transferor Scheme, there is payable by the Trustee to the trustee of the Transferee Scheme:

(i) a superannuation lump sum calculated in accordance with subclause 12A.12; and

(ii) the difference between:

(1) the sum of the primary and supplementary amounts calculated in accordance with clauses 12A.13 and 12A.14; and

(2) the superannuation lump sum referred to in paragraph (i).

(b) It is the duty of the Trustee to ensure that the payments prescribed by this clause are duly made and credited to the appropriate accounts for the employee concerned in the Transferee Scheme.

[amended by Deed of Amendment No.[26] operative 01/07/07]

12A.12 Superannuation lump sum

(a) For a Category 1 or 2 Elector, the superannuation lump sum is the amount that would have been immediately payable to the person, in accordance with the Rules, on the person's resignation from his or her employment.

(b) For a Category 3 Elector, the superannuation lump sum is the sum of:

(i) the amount that would have been payable if, on the date the election takes effect, the person had elected to take the benefit payable under section 52I of the *Superannuation Act 1916* or subrule 16.11 of Division C of the LGSS; and

(ii) the amount of benefit to which the person was entitled on that date under the *State Authorities Non-contributory Superannuation Act 1987* or Division C of the LGSS.

(c) For a Category 4 Elector, the superannuation lump sum is the sum of:

(i) the amount that would have been payable if, on the date the election takes effect, the person had elected to take the benefit payable under section 43(7) of the *State Authorities Superannuation Act, 1987* or subrule 5.10.10 of Division B of the LGSS; and

(ii) the amount of benefit to which the person was entitled on that date under the *State Authorities Non-contributory Superannuation Act, 1987* or Division C of the LGSS.

(d) For a Category 5 Elector, the superannuation lump sum is the sum of:

(i) the amount of Benefit to which the person would have been entitled under subrule 5.10.10 of Division B if the person had resigned from employment and had, on the date the election takes effect, made any necessary election under that Schedule; and

(ii) the amount of Benefit to which the person was entitled on that date under Division C.

(e) For a Category 6 Elector, the superannuation lump sum is the sum of:

(i) the amount of cash termination Benefit to which the person would have been entitled under subrule 16.11 of Division D if the person had resigned from employment and had, on the date the election takes effect, made any necessary election under that Schedule; and

(ii) the amount of Benefit to which the person was entitled on that date under Division D.

[amended by Deed of Amendment No.[26] operative 01/07/07]

12A.13 Primary amount

(a) For a Category 1, 3 or 4 Elector, the primary amount is the amount determined by STC or LGSS Pty Limited on actuarial advice to be the value of the person's accrued Benefit in the State Authorities Superannuation Scheme or State Superannuation Scheme or LGSS Division B or LGSS Division D, as the case may be, at the time of the Election.

(b) For a Category 2, 5 or 6 Elector, the primary amount is the amount determined by the Trustee on actuarial advice to be the value of the person's accrued Benefit in Division B or D, as the case may be, of the Fund at the time of the Election.

12A.14 Supplementary amount

(a) For a Category 1, 3 or 4 Elector, the supplementary amount is the amount of benefit to which the person was entitled under the State Authorities Non-contributory Superannuation Act, 1987 or Schedule 3 of the LGSS Trust Deed on the date the election takes effect.

(b) For a Category 2, 5 or 6 Elector, the supplementary amount is the amount of Benefit to which the person was entitled under Division C on the date the election takes effect.

12A.15 Duty of trustees to persons eligible to make Election

(a) It is the duty of the Trustee under an Election made by an eligible person to transfer to the Fund, to establish the person as a member of or contributor to the Fund.

(b) An Elector transferring from the State Authorities Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or LGSS Divisions B and C is to be established in Divisions B and C.

(c) An Elector transferring from the State Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme or LGSS Divisions C and D is to be established in Divisions C and D.

(d) An Elector transferring from the Police Superannuation Scheme and the State Authorities Non-contributory Superannuation Scheme is to be established in Divisions B and C.
[(d) inserted by Deed of Amendment No.16 operative 1/7/97]

12A.16 Trustees to determine rights of person transferring

(a) The Trustee is to determine with actuarial advice, the rights of the Elector in the Fund.

(b) Regard must also be had to any rights the Elector had in the Transferor Scheme and the rights established in Divisions B and C or Divisions C and D must be as near as possible to them.

(c) In particular, the Trustee is to take into account the following:

(i) the person's accrued Benefits in the Transferor Scheme, as certified by the trustee of that scheme;

(ii) the Benefits that the person could have accrued by normal retirement age in the Transferor Scheme;

(iii) the person's employment status (including salary and whether full-time or part-time) in the Fund, on commencement or recommencement of membership of Division B or Division D.

(iv) the amounts being transferred to the Fund by the Transferor Scheme

(d) In the case of a Category 3, 4 5 or 6 Elector, the Trustee must also take into account:

(i) the period of employment with any employer responsible for making contributions under either the Transferor or Transferee Scheme, in the period between the date the Benefit was deferred and the date that the person again becomes a member of the Transferee Scheme; and

(ii) any employer contributions made by any such employer to any complying superannuation fund in respect of the person during that period.

12A.17 Automatic accrual of certain rights

(a) A person, who by election, joins or rejoins Division D of the Fund is taken to have met the medical requirements of Rule 3 of Division D.

(b) A person who was covered for Additional Benefits in the State Authorities Superannuation Scheme or LGSS Division B and who by election joins or rejoins Division B of the Fund is taken to have submitted an application for Additional Benefit cover under Rule 3.2.1 of Division B and the Trustee is taken to have approved that application.

(ba) A person who was a contributor to the Police Superannuation Scheme on the appointed day and who, by election, joins Division B of the Fund is taken to have submitted an application for Additional Benefit cover under Rule 3.2.1 of Division B and the Trustee is taken to have approved that application.
[inserted by Deed of Amendment No.16 operative 1/7/97]

(c) Additional Benefit cover imputed by subclause 12A.17 (b) or (ba) may be revoked in accordance with the relevant Rules of the Fund.
[amended by Deed of Amendment No.16 operative 1/7/97; Deed of Amendment No.[21] operative 1/7/01]

12A.18 Effect of transfers and appeal rights

(a) On the election taking effect, and subject to any appeal rights in this clause, the person who makes the election ceases to have any entitlements, rights and obligations under the scheme from which the person transferred to the extent to which the member is transferred.

(b) The rights of appeal available to an Elector before a Transfer Option takes effect continue to apply in respect of matters arising before that option takes effect and any matters as to payment from the transferor scheme.

(c) An elector who transfers to the Fund has, in respect of any determination by the Trustee as to the elector's rights on transfer to Divisions B and C or Divisions C and D, the same rights of appeal as in respect of a determination by the Trustee under the Trust Deed.

13. INSURANCE POLICIES

13.1 Insurance policies effected by Trustee

The Trustee may effect insurance policies in its own name by a separate insurance policy or as part of the insurance provided in respect of a number of Beneficiaries under a group or master policy issued to the Trustee. The terms of an insurance policy in respect of a Beneficiary shall bind the Beneficiary and any person who is or becomes entitled to a Benefit in respect of the Beneficiary.

13.2 Operation of insurance policy

Any Insured Benefit shall be subject to the terms of any insurance policy under which it is provided and no payment shall be required to be made in respect of a Beneficiary in satisfaction of any Insured Benefit of any amount greater than the amount received by the Trustee under the insurance policy less any deductions for Taxes the Trustee is entitled to make under this Deed.

13.3 Cover declined

If the insurer under an insurance policy declines to provide, or will only provide subject to qualifications, insurance for any Insured Benefit under that policy then the Trustee shall not be required to arrange any other or alternative insurance policy.

13.4 Medical examination and availability of insurance policy

In respect of any Insured Benefit, the obligations of the Trustee to effect an insurance policy under this clause shall be conditional upon the Beneficiary submitting to such medical examination and providing such information as the insurer under an insurance policy requires.

13.5 Establishment of advisory panels

The Trustee may establish one or more panels comprised of people it considers suitably qualified to advise it on matters arising in relation to any Insured Benefits or under or in relation to any insurance policy, matters in relation to claims for Benefits (including claims for Benefits on disablement) and any other matters is considers necessary or desirable.

14. BENEFITS

14.1 Compliance with Superannuation Law

The payment of Benefits shall be subject to Superannuation Law and the Trustee shall not be required to pay a Benefit to a Beneficiary, dependant, legal personal representative or any other person other than in accordance with Superannuation Law.

14.2 Compulsory payment of Benefit

If the Trustee is required to pay a Benefit at or by a certain time by Superannuation Law or is otherwise required to pay a Benefit by Superannuation Law then notwithstanding any provision in the Rules or the fact that a claim has not been made under this clause, the Trustee may pay the Benefit to or in respect of a Beneficiary in accordance with Superannuation Law, less any deduction that is required to be made in respect of any Taxes.

14.3 Treatment of certain Benefits

Subject to the Rules, if any Benefit (or part of any Benefit) otherwise payable to a Beneficiary is unable to be paid in cash by reason of Superannuation Law then the Benefit may be transferred to another Eligible Fund elected by the Beneficiary and approved by the Trustee.

14.4 Payment of Benefits

Subject to the Rules, the Trustee may pay the Benefit to or in respect of a Beneficiary by way of lump sum, pension or by purchase of an annuity and otherwise in accordance with the Rules applicable to the Beneficiary.

14.5 Place and manner of payment

(a) Subject to this Deed, Benefits shall be payable at the place and in the manner as determined or approved of by the Trustee and the Trustee may make payment by cheque or cause an insurer to draw and pay by cheque on behalf of the Trustee and the Trustee or insurer may mail the cheque to the payee at the last address known to the Trustee of that payee.

(b) Notwithstanding any other provision of this Deed, a Beneficiary shall not be entitled to be paid a Benefit until the Trustee has:

(i) in the case of sub-clause 14.2, determined to pay a Benefit; or

(ii) in any other case, received a claim from an Employer or Beneficiary (as the case may be) together with such other information as the Trustee may require,

and in the case where any Insured Benefit is payable, the insurer under an insurance policy has determined to accept and pay the claim.

14.6 Proofs

Whenever it is necessary for the Trustee to decide questions of fact the Trustees may act upon such proofs or presumptions as it considers satisfactory whether or not they are strictly legal proofs or legal presumptions.

14.7 Payment of Benefit conditional upon evidence

The Trustee may suspend payment of a Benefit until all information and evidence required by the Trustee is received from the Employer, the Beneficiary or the person to whom the Benefit is to be paid and in particular the Trustee may require any person to whom a Benefit is to be paid to satisfy the Trustee that the person is entitled to receive the Benefit in accordance with Superannuation Law.

14.8 Discharge of Trustee

The receipt of a person to whom a Benefit is paid shall absolutely discharge the Trustee in respect of the Benefit paid to that person and the Trustee is not bound to see to the application of that Benefit.

14.9 Legal disability of person

If it appears to the Trustee that a Beneficiary or other person to whom a Benefit would otherwise be payable is under any legal disability or is unable for any reason whatsoever to satisfactorily deal with such Benefit the Trustee may pay or apply the whole or part of any such Benefit in one or more of the following ways:

(a) to any dependant of the Beneficiary or other person;

(b) for or towards the maintenance, education, advancement or otherwise for the benefit of the Beneficiary, other person or any dependant of the Beneficiary

or other person in such form and manner and subject to such terms and conditions as the Trustee thinks fit; and

(c) without limiting paragraph (b), to a person who appears to the Trustee to be a trustee or is willing to act as trustee for or a parent or guardian of or to have for the time being the care or custody of the Beneficiary or other person or to have the financial expense of the care or custody of the Beneficiary or other person.
[amended by Deed of Amendment No.9 operative 28/3/01]

In this clause, ***dependant*** has the same meaning as in Superannuation Law.

14.10 Trustee not obliged

The Trustee is not obliged to have recourse to clause 14.9 or to consider whether recourse should be had to clause 14.9 notwithstanding that the Trustee may have actual notice of any legal disability of the Beneficiary or other person.

14.11 Claim for Benefits

Upon the Trustee being satisfied that a claim for an Insured Benefit has arisen, the Trustee shall, as soon as practicable, lodge a claim with the insurer in relation to that Beneficiary and upon receiving payment of such Insured Benefit the Trustee shall promptly pay such Benefit to or in respect of the Beneficiary or cause the insurer to pay the Benefit to or in respect of the Beneficiary.

14.12 Notice of claim

An Employer or Beneficiary shall promptly advise the Trustee of any event which would entitle a Beneficiary to receive a Benefit in such form as is required by the Trustee.

14.13 Trustee may require proof of continued employment

The Trustee may by notice in writing to a Beneficiary (other than a Pensioner) require the Beneficiary to provide evidence satisfactory to it that the Beneficiary is gainfully employed to a level required under the Superannuation Law or is otherwise not entitled to be paid a Benefit and if the Beneficiary has reached an age at which a Benefit is payable and the Trustee is not satisfied that the Beneficiary is gainfully employed to a level required under the Superannuation Law or is otherwise prohibited from receiving a Benefit then the Trustee may pay the Benefit to the Beneficiary as if that Beneficiary had become entitled to it on the date of payment.
[amended by Deed of Amendment No.[23] operative 1/7/04]

14.14 Deferral of Benefit payment

Where the Trustee must dispose of any assets of the Fund and convert them to cash in order to pay a Benefit, the Trustee may delay payment of the Benefit for such period as the Trustee sees fit in order to reasonably facilitate the orderly disposal of those assets.

14.15 Maximum liability of Trustee

Notwithstanding any other provision of this Deed or the Rules, the Trustee shall not be required to make any payment from the Fund in excess of the net realisable assets of the Fund nor shall any Employer or Beneficiary bear any liability for such excess.

14.16 Discharge by trustee of eligible rollover fund

The receipt of the trustee of an eligible rollover fund in respect of the Benefit of a Beneficiary paid to that eligible rollover fund shall absolutely discharge the Trustee in respect of the Benefit of that Beneficiary and the Beneficiary shall cease to have any rights against the Fund.

14.17 Payment of Benefits without grant of probate

If a Beneficiary dies and:

(a) a Benefit is, or becomes, payable from the Fund in relation to the Beneficiary;

(b) production to the Trustee of probate of the will, or letters of administration of the estate, of the Beneficiary has not been arranged;

(c) the Trustee has not, within the period of 3 months that next succeeds the death of the Beneficiary, received a notice of intention to apply for a grant of probate of the will, or letters of administration of the estate, of the Beneficiary, and

(d) the Trustee has not made a determination to pay the Benefit in accordance with the Rules,

subject to Superannuation Law, the Trustee may, if it so decides, make a payment of the whole or any part of the Benefit, being a payment that does not exceed $20,000 or such other lesser amount as determined by the Trustee.
[amended by Deed of Amendment No.8 operative 1/7/97; amended by Deed of Amendment No.9 operative 27/6/01]

14.17A Binding Beneficiary Nomination
[inserted by Deed of Amendment No.9 operative 27/6/0; replaced by Deed of Amendment No.[24] operative 24/10/05]

14.17A.1 Nominated beneficiary

A Member may request the Trustee by notice in a form prescribed by the Trustee that if upon the death of the Member a Benefit becomes payable in respect of that Member then all or a specified part of that Benefit is to be paid to the Nominated Beneficiary. The Trustee shall comply with the requirements of Superannuation Law for the acceptance and continuing operation and validity of Binding Nominations.

14.17A.2 Payment of Death Benefit where no Binding Death Benefit Nomination

If there is no Nominated Beneficiary then the Trustee shall pay the Benefit:

(a) Where the Member is survived by his or her Spouse, to the Member's Spouse.

(b) Where the Member is not survived by a Spouse, to the legal personal representative of the Member.

14.17A.3 Variation of nomination

If a Member notifies the Trustee in writing of a variation to any previous nomination of a Nominated Beneficiary or any request in relation to a Nominated Beneficiary, then that variation shall not take effect unless and until it is received and accepted by the Trustee and the Trustee is satisfied that it meets the requirements of Superannuation Law for a binding death benefit nomination, and in that event it shall terminate any prior nomination or request given by the Member.

14.18A Competing claims for Spouses' Benefits
[inserted by Deed of Amendment No.9 operative 27/6/01]

(a) If a Benefit would be payable to more than one person because:

(i) a deceased Contributor, Member or pensioner; or

(ii) a deceased former Contributor, Member or pensioner,

has left more than one Spouse, then, despite any other provision of the Deed or Rules:

(iii) the Benefit is payable in accordance with a determination made by the Trustee, and not otherwise; and

(iv) the total amount of Benefit payable to those persons at any time is not to exceed the amount of Benefit that would be payable if there were only one Spouse.

(b) For the purposes of subclause (a), the Trustee may determine in relation to a Benefit:

(i) that the Benefit is not payable to such of the persons concerned as it specifies;

(ii) that the amount of the Benefit is to be apportioned between the persons concerned in such manner as it specifies; or

(iii) to pay part or all of the Benefit to the legal personal representative of the deceased Beneficiary.

14.18 Payment of Benefits – *Family Provision Act*
[deleted by Deed of Amendment No.9 operative 27/6/01]

14.19 Payment to legal personal representative
[deleted by Deed of Amendment No.9 operative 27/6/01]

14.20 Benefit not part of estate

A Benefit payable on the death of a Beneficiary is not an asset in the Beneficiary's estate, unless it is paid to the estate.

14.21 Loss of rights, privileges or benefits

If a person is entitled to exercise a right or enjoy a privilege or benefit under the Rules and, without having exercised the right or enjoyed the privilege or benefit, the person ceases to be entitled to do so, the person may exercise the right or enjoy the privilege or benefit if the Trustee determines (whether subject to conditions or otherwise) that it is just and equitable for the person to do so and gives its consent to the exercise or enjoyment by the person of the right, privilege or benefit.

14.22 Financial hardship

The Trustee may determine, and vary:

(a) a minimum Benefit Account balance which must remain in a Division after payment of an amount to a Beneficiary on the grounds of severe financial hardship; and

(b) any criteria for eligibility for payment on the grounds of severe financial hardship.

14.23 Reduction in Pensions and Benefits to offset Tax
[inserted by Deed of Amendment No.[1] operative 27/4/98]

14.23.1 Whenever:

(a) a right to a Benefit under this Fund accrues to or in respect of a Beneficiary or former Beneficiary or where a Family Court Order, a Superannuation Agreement or Flag Lifting Agreement applies, and
[amended by Deed of Amendment No.[21] operative 28/12/02]

(b) the Trustee has paid or is liable to pay an amount of Superannuation Contributions Surcharge in respect of contributions, notional contributions or allocated surplus amounts that are referrable to the Beneficiary or former Beneficiary,

the Trustee must, subject to clause 11.9 and subclause 14.23.2, make a determination reducing the employer-financed portion of that Benefit by the amount of debt (including accrued interest) owed for Superannuation Contributions Surcharge in respect of the Contributor or former Contributor, less any payments made by the Contributor or former Contributor towards reduction of the debt.

14.23.2 Subclause 14.23.1 does not authorise the reduction of a Benefit as a result of a liability for Superannuation Contributions Surcharge where the benefit is of a kind the Trustee has determined should not be the subject of the reduction.

14.24 Commutation of pensions for adjustment of benefits
[inserted by Deed of Amendment No.[1] operative 27/4/98]

14.24.1 If a determination reducing a Benefit that may be taken in the form of a pension is made under clause 14.23, the Trustee may, at its discretion and with the consent of the Contributor or former Contributor concerned, commute part of the pension to a lump sum for the purposes of payment to the Trustee of the amount of the reduction.

14.24.2 Commutation of part of a pension under this clause:

(a) does not affect any other right that the Contributor or former Contributor has to commute the pension under the Fund, and

(b) is not to be taken into account for the purpose of determining whether, and to what extent, any such other right may be exercised, and

(c) is to be done on a basis determined by the Trustee for the purposes of this section.

14.24.3 the Trustee may obtain actuarial advice for the purpose of determining the basis on which part of a pension is to be commuted under this section.

14.24.4 This section has effect despite any other provision of this Deed.

14.25 Payment of benefits – Family Law Act requirements
[Subclause inserted by Deed of Amendment No.[21] operative 28/12/02]

14.25.1 Where a person is a Member of Pool A of the Fund, their Non-Member Spouse may direct the Trustee to open a separate account within Pool A of the Fund or else rollover the entitlement to another Eligible Fund. In the absence of any direction, the Trustee shall establish a separate account within Pool A for the Non-Member Spouse. On the opening of the account, the Non-Member Spouse will be accepted as a Member of the Division within Pool A determined by the Trustee.

14.25.2 Where a person is a Member of Pool B of the Fund, their Non-Member Spouse may direct the Trustee to rollover their entitlement to another Eligible Fund. In the absence of any direction, the Trustee shall rollover the entitlement to an eligible rollover fund.

14.25.3 The Trustee shall reduce the Member's Superannuation Interest in accordance with the provisions set out in the rules of the Member's Divisions.

14.25.4 The Trustee shall comply with any Family Law Order made in accordance with section 90MV of the Family Law Act terminating the operation of a Splittable Payment.

14.25.5 If the Non-Member Spouse dies after the Operative Time for a payment split:

(a) the payment split nevertheless continues to operate;

(b) the payment split then operates in favour of the legal personal representative of the deceased Non-Member Spouse and is binding on that legal personal representative; and

(c) the legal personal representative has all the rights the deceased Non-Member Spouse would have had in respect of the payment split, including the right to serve a waiver notice under section 90MZA of the Family Law Act.

14.25.6 The Trustee shall calculate the value of a Family Law Spouse Amount in respect of a Member's Superannuation Interest in accordance with the rules applying to the Member's Divisions, as amended from time to time.

14.25.7 The Trustee may adjust a benefit amount for investment earnings from the Operative Time to the day before the transfer date if a Superannuation Interest is not split until after the Operative Time.

14.25.8 The Trustee may charge or recover from a person, including a Member and Non-Member Spouse, such fees and costs in relation to any Family law dealings, unless prohibited by law.

14.25.9 The Trustee shall not be liable for any loss or damage suffered by any person because of things done (or not done) by the Trustee in good faith in reliance on:

(a) any document served on the Trustee for the purposes of this clause 14.25; or

(b) a Family Court Order.

15. FORFEITURE OF BENEFITS

The interest in the Fund of a Beneficiary and those entitled to a benefit on the death of the Beneficiary is personal to that person and the Trustee shall not recognise any assignment, claim or charge in respect of that interest unless that assignment, claim or charge is permitted expressly or by necessary implication by Superannuation Law.

16. EXPENSES AND TAXATION

16.1 Payment of Tax

The Trustee shall pay such Taxes or instalments thereof in respect of the Fund as may be determined pursuant to, and in accordance with, the provisions of relevant legislation and the Trustee may allocate the Taxes among Benefit Accounts as appropriate, establish Benefit Accounts for providing for Taxes or reserves for Taxes and realise any asset of the Fund (including any insurance policy, or units or interests under any insurance policy) in whole or in part allocated to those Benefit Accounts for the purpose of meeting its liability under this clause.

16.2 Provision for Tax

Notwithstanding any provision of this Deed, the Trustee may from time to time and at any time deduct, set aside and make a provision or provisions from the Fund for such Tax as it, in good faith, and in its absolute discretion and in accordance with

relevant legislation estimates will be payable from time to time by the Fund in respect of the relevant year of income and, without limitation, in deducting and setting aside and making provision for such Tax the Trustee shall be entitled to have regard to the unrealised capital gains accrued on any investments of the Fund and any other matter or thing which the Trustee in good faith and in its absolute discretion considers appropriate and the Trustee may transfer amounts from any Benefit Accounts to Benefit Accounts established for the purpose of providing for Taxes or reserves for Taxes.

16.3 Taxation credits or rebates

Subject to the Income Tax Acts, where the Trustee is in receipt of any income in respect of which there arises any taxation credit or rebate, the Trustee shall be entitled in its absolute discretion to offset such credits or rebates against any provisions for Tax established pursuant to this Deed and, notwithstanding the time at which such credits or rebates are received, shall be entitled in its absolute discretion to apportion such credits or rebates across the relevant year of income for the purposes of the Income Tax Acts as the Trustee thinks fit.

16.4 Adjustments

The Trustee shall pay Taxes for the Fund as determined pursuant to the Income Tax Acts and shall, in respect of the amount or amounts of such payments debit the provisions for Taxes made pursuant to this Deed in respect of the year of income to which such Taxes relate and:

(a) where the provisions for Taxes made in respect of any year of income exceed the Taxes payable in the year of taxation in respect of such year of income, the Trustee shall credit the provisions for the Fund in respect of the next succeeding year of income (or part thereof as the Trustee in its absolute discretion determines) with such amount or otherwise deal with it as it considers equitable; and

(b) where the provisions for Taxes made in respect of any year of income is less than the amount of Taxes payable in the year of taxation in respect of that year of income, the Trustee shall be entitled, as the Trustee sees fit, to debit the excess of Taxes to such provisions for Taxes the Trustee may have made in respect of the next succeeding year of income of the Fund (or part thereof as the Trustee in its absolute discretion determines).

16.5 Expenses and obligations

Notwithstanding anything contained in this Deed, the Trustee may from time to time and at any time:

(a) realise any asset of the Fund in whole or in part; and

(b) from the Fund deduct, set aside and make a provision or provisions,

as the Trustee in good faith and in its absolute discretion deems proper for meeting anticipated expenses or obligations as in the opinion of the Trustee should be

provided for, including (without limitation) a provision or provisions for Tax which will or may in the opinion of the Trustee be payable in respect of capital gains which may or might be realised on the disposal of assets of the Fund in succeeding years of income. Such realisation of assets, deduction, setting aside or provision may be made from or against such part of the Fund as the Trustee in its absolute discretion deems appropriate.

16.6 Determination by Trustee

Notwithstanding anything contained in this Deed the Trustee may in its absolute discretion determine:

(a) whether any amount received or receivable is or is to be received on capital or income account, or whether any outgoing, loss, expense, provision or amount is incurred on capital or income account;

(b) whether a capital profit or loss has been realised;

(c) the amount of any realised or unrealised capital profit or loss;

(d) the amount of any consideration received on the disposal of a part of the Fund;

(e) the amount paid or deemed paid or the value given for a part of the Fund at the time it became part of the Fund; or

(f) whether any Tax is payable and, if so, the amount payable,

and every such determination shall be final and conclusive and no Beneficiary or former Beneficiary shall have any right or claim against the Trustee personally arising out of such decision or its implementation but shall not by reason of this proviso be debarred from asserting any claim in respect of his interest in the Fund.

16.7 Arrangements with other entities

The Trustee may from time to time and at any time in its absolute discretion and upon such terms as it sees fit enter into an arrangement or arrangements with an insurer under an insurance policy, a registered organisation or a pooled superannuation trust or any other appropriate entity which has the effect of transferring to that entity all or part of the liability for Tax of the Fund.

17. CONDITIONS OF EMPLOYMENT NOT AFFECTED

Nothing in this Deed whether express or implied shall:

(a) in any way restrict an Employer in varying or terminating any contract of employment or terms of engagement of a Member;

(b) in any action against an Employer by a Member be used as a ground for awarding damages or compensation or increasing an award for damages or

compensation or for conferring any rights on a Member other than those expressly conferred by this Deed.

18. NATIONAL OR OTHER SUPERANNUATION SCHEMES

18.1 Variation of Contributions and Benefits

Subject to this Deed and Superannuation Law, if any government introduces or varies any scheme (including any scheme to which an Employer becomes obliged to contribute under any prescribed agreement or award) for insurance, superannuation, social service, pension or retirement benefits in respect of which Members may be or become eligible the Trustee may in such manner as is permitted by Superannuation Law reduce or otherwise vary:

(a) the Contributions made by an Employer and Members employed by that Employer and the basis on which those Contributions are vested; and

(b) the Benefits payable in respect of those Members under this Deed.

18.2 Prescribed Agreements and Awards

If with the intention of complying with any requirement to provide any superannuation benefits required under any prescribed agreement or award, an Employer or Member makes Contributions to any Division then:

(a) the Employer or Member must satisfy him, her or itself that the payment of the Contribution and the terms of the Fund meet the requirements of any such prescribed agreement or award;

(b) the Trustee shall not be liable to the Employer, the Member or any of the Employer's Members for any failure of those Contributions or the Division to which they are applied to satisfy the requirements of any such prescribed agreement or award;

(c) if the Employer or Member notifies the Trustee that the payment of the Contributions to the Division is in breach of any such prescribed agreement or award then the Trustee may refuse to accept any further Contributions paid in that regard and may transfer the Benefit or part of the Benefit that has arisen from those Contributions to an Eligible Fund that complies with the requirements of the relevant prescribed agreement or award in accordance with the provisions of clause 12.

19. RULES

19.1 Inconsistency

If the Rules are inconsistent with any other provisions of the Deed then the provisions of the Deed shall prevail unless the Rules expressly provide to the contrary.

19.2 Express provision in Rules

A provision in the Rules that deals with the same matter as another provision in the Deed shall not be taken to limit the other provision appearing in the Deed unless it does so expressly.

20. AMENDMENT OF TRUST DEED

20.1 Amendments

Subject to sub-clauses 20.2 and 20.4, the Trustee may, with the consent of the Minister, at any time by Deed or by oral or written resolution, amend, add to, delete or replace all or any of the provisions contained in this Deed, including the provisions of this clause, and the amendment, addition to, deletion or replacement may be retrospective or take effect on a specified date.

20.2 Amendment not to reduce Benefits

No amendment shall be made under sub-clause 20.1 which would have the effect of adversely altering a Beneficiary's right or claim to accrued Benefits or the amount of those accrued Benefits unless such amendment is permitted by Superannuation Law.

20.3 Actuary's advice

In determining whether or not the effect specified in sub-clause 20.2 will occur the Trustee may rely on the advice of the appointed Actuary (if any).

20.4 Amendment not to permit natural person trustee

No amendment shall be made to the Deed which would have the effect of permitting a natural person to be appointed as trustee of the Fund unless after the amendment the sole or primary purpose of the Fund is the provision of pensions.

20.5 Amendments to New Divisions

[inserted by Deed of Amendment No.[1] operative 27/4/98]

The Trustee may, in its absolute discretion, exercise its powers in clause 20.1 without requiring the consent of the Minister, to amend, add to, delete or replace all or any of the provisions of a new Division created in accordance with clause 3.7.

21. SUPERANNUATION LAW

21.1 Superannuation Law deemed to be included

Notwithstanding any provision of this Deed any provision of Superannuation Law that is required to be included in this Deed for the Fund to remain or to be a complying superannuation fund shall be deemed to be included in this Deed as if every such provision was set out in this Deed on and from the date that the provision is required to be so included.

21.2 Inconsistency of provisions

In the event of any inconsistency between the provisions deemed by sub-clause 21.1 to be included in this Deed and the terms of this Deed, the provisions deemed to be included by sub-clause 21.1 shall prevail.

21.3 Trustee not in contravention

The Trustee shall not be taken to be in contravention of this Deed or to be in breach of trust if it does anything or fails to do anything which is in contravention of Superannuation Law if the Superannuation Authority is satisfied that the contravention does not warrant the giving of a notice that the Fund is not a complying superannuation fund in relation to a year of income.

21.4 Modification or exemption

Subject to Superannuation Law, the Trustee may seek modification of or exemption from the requirements of Superannuation Law, and if any modification or exemption is granted by the Superannuation Authority, the Trustee is relieved from compliance with those provisions of the Trust Deed and Superannuation Law expressed in that modification or exemption subject to any conditions in that modification or exemption.

22. TERMINATION OF FUND OR DIVISION

22.1 Termination of Fund

If:

(a) the Trustee determines that it has become impracticable or inexpedient to continue the Fund; or

(b) there are no Employers who are responsible to make contributions to the Fund and the Trustee determines that it is not likely that any person will apply to become an Employer,

the Trustee may, with the consent of the Minister, terminate the Fund from a date agreed between the Trustee and the Minister (***Termination Date***).

22.2 Consequences of termination

On and from the Termination Date:

(a) no further Employees shall be admitted to membership of the Fund; and

(b) the Trustee shall not accept any further Contributions (other than those due on or prior to the Termination Date) and all outstanding Contributions shall be paid forthwith.

22.3 Payments on termination

Upon termination of the Fund, the Trustee shall make such provision out of the assets of the Fund as is necessary to provide for the following in the following order of priority:

(a) Tax, whether or not assessed or presently payable;

(b) expenses of the Fund, including those incurred or to be incurred by the Trustee in connection with the termination of the Fund;

(c) Benefits which became payable prior to the Termination Date;

(d) in the case of Division A to E:

(i) Benefits which would be payable to each Deferred Member had the Deferred Member's Benefit become payable at the Termination Date; and

(ii) an amount equal to the Benefit which would be payable to each Member in accordance with the Rules of the relevant Division if the Member's employment was terminated by the Employer on that date or such greater amount as the Trustee with the consent of the Minister may determine; and

(e) in the case of Division B, C and D the Trustee shall continue to hold the assets of Pool B on trust for the Beneficiaries and that Division in accordance with this Deed until all Benefits have been paid and any assets remaining shall thereupon be applied as the Trustee, with the consent of the Minister, may determine.

22.4 Surplus

If after making the provisions set forth in sub-clause 22.3 the Trustee is of the opinion that the value of assets of the Fund exceeds the value of the liabilities then the excess amount may be applied by the Trustee for any of the following purposes:

(a) to be repaid to an Employer;

(b) in increasing the provisions made for Beneficiaries of the Fund as at the Termination Date;

(c) to be paid to the State of New South Wales;

(d) for such other purposes as the Trustees and Minister may agree.

22.5 Payment of Benefits on termination

The Benefits payable on termination of the Fund shall be in such form and be provided through such arrangements as the Trustee and the Employer shall determine including by way of transfer to an Eligible Fund nominated by the Employer as the fund to which it will be making contributions in respect of Members after the Termination Date. Each Beneficiary shall accept the Benefits allotted by the Trustee

in full discharge of all claims in respect of the Fund and shall have no further claim whatsoever in relation to the Fund. Any decision by the Trustee in relation to the amount or method of payment of any such Benefits shall be final. In the absence of any agreement with the Employer as to the Eligible Fund to which a Beneficiary's Benefit should be transferred, the Trustee may transfer the Benefit to a successor fund.

22.6 Termination of Division

If the Trustee determines that it has become impracticable or inexpedient to continue a Division, the Trustee may, with the consent of the Minister, terminate the Division from a date agreed between the Trustee and the Minister ***(Termination Date)***. If a Division is to be terminated, the provisions of clauses 22.2 and 22.3 apply as though references to the "***Fund***" were references to a ***"Division"***.

22.7 Termination of Pool

If the Trustee determines that it has become impracticable or inexpedient to continue a pool, the Trustee may, with the consent of the Minister, terminate the pool from a date agreed between the Trustee and the Minister (***Termination Date***). If a Pool is to be terminated, the provisions of clauses 22.2 and 22.5 inclusive apply as though references to the "***Fund***" were references to a "***Pool***".

22.8 Termination of participation of Employer on occurrence of certain events

If any of the following events occur, the Trustee may, by notice to an Employer, terminate the participation of that Employer in a Fund:

(a) if the Employer with the consent of the Minister terminates its Contributions to the Fund;

(b) the Employer ceases to carry on business or is placed in liquidation; or

(c) if there ceases to be any Members employed by that Employer in the Fund;

(d) if a provision as to termination in an Employer's Deed of Adherence applies,
[(d) inserted by Deed of Amendment No.18 operative 5/2/03]

Paragraph (a) does not apply where it is provided in the Employer's Deed of Adherence that it does not apply. A provision as to termination in an Employer's Deed of Adherence may also confer on the Employer the right to terminate its participation in the Fund.
[paragraph inserted by Deed of Amendment No.18 operative 5/2/03]

22.9 Termination procedures

On termination of participation by an Employer in the Fund pursuant to sub-clause 22.8:

(a) the Trustee after consultation with the Employer shall specify a date ***(Retirement Date)*** upon which the Employer shall retire;

(b) the Employer shall immediately pay all arrears, if any, of Contributions up to the Retirement Date;

(c) Benefits which have become payable on or before the Retirement Date shall continue to be payable out of the Fund; and

(d) the Trustee after obtaining the advice of the Actuary shall certify what proportion of the Assets of the Fund, including arrears, if any, of Contributions still to be made pursuant to sub-clause 22.8(b), is properly attributable to Members who were in the employ of the Employer at the Retirement Date.

22.10 Consequences of termination of participation of an Employer

Upon the termination of an Employer's participation in the Fund, the Trustee shall notify all Members employed by that Employer ***(Out-Going Members)*** and from the date of that notice, the Out-Going Members shall cease to be entitled to contribute to the Fund without the consent of the Trustee.

22.11 Provision for Out-going Members

The Trustee shall appropriate in respect of each Out-Going Member an amount equal to the Benefit which would be payable to the Member in accordance with the appropriate Division of this Deed if the Member's employment was terminated by the Employer on that date or such greater amount as the Trustee may determine ***(Appropriated Amount)***.

22.12 Payment of Appropriated Amount

The Trustee shall pay or apply the Appropriated Amount in respect of each Out-Going Member to another Eligible Fund with the consent of the Out-Going Member or as otherwise permitted by Superannuation Law.

22.13 No further claims

An Out-going Member to whom an Appropriated Amount has been paid or applied under sub-clause 22.12 shall have no right or claim against the Fund.

22.14 Final Accounts

The Trustee shall cause final accounts of the Fund to be prepared and shall have those accounts audited by the Auditor.

23. PAYMENTS TO EMPLOYER

23.1 Payment of surplus or reserve amounts

Subject to sub-clause 23.2, no amount shall be paid to an Employer under this Deed other than in compliance with Superannuation Law.

23.2 Payment for services rendered

The Trustee may pay an amount to an Employer in respect of services rendered by it in connection with the management or operation of the Fund.

24. COMPLAINTS

24.1 Complaints procedure

The Trustee will establish a complaints procedure to deal with complaints by Beneficiaries in a manner required by Superannuation Law. The procedure will be determined by the Trustee in its absolute discretion.

24.2 Appeal from Trustee's decision

In addition to any right that a Beneficiary who became a Beneficiary pursuant to the Transfer Regulation referred to in clause 3.3 may have to challenge the Trustee's decision under Superannuation Law, such Beneficiary may appeal against any decision of the Trustee to the Industrial Relations Commission. Any appeal to the Industrial Relations Commission must be made within six months after the Beneficiary is notified of the decision or determination of the Trustee or within such further period as the Industrial Relations Commission allows. Any appeal to the Industrial Relations Commission shall be subject to the provisions of section 40 of the Administration Act.

24.3 Complaints to delay payment

The Trustee shall have no obligation to pay any Benefit on the death of a Beneficiary (other than a person who became a Beneficiary pursuant to the Transfer Regulation referred to in clause 3.3) until:

(a) the time to lodge a complaint or appeal by the persons notified by the Trustee under the Complaints Act has lapsed; and

(b) any complaint or appeal has been dealt with.

25. NOTICES AND ELECTIONS

25.1 Notice by Trustee

Subject to Superannuation Law, any notice or information required to be given by the Trustee to:

(a) Beneficiaries under this Deed shall be deemed to have been duly given if given in writing to a Beneficiary by letter addressed to the Beneficiary at the Beneficiary's last known address;

(b) an Employer shall be deemed to have been duly given if given in writing to the Employer at the address advised in writing to the Trustee.

Any notice given by post shall be deemed to have been served at the time when it was posted and in proving such service it shall be sufficient to prove that the letter containing the notice was properly addressed and posted and a statement signed by the Trustee that it was so addressed and posted and when it was so posted shall be conclusive of that fact.

25.2 Notice to Trustee

Any notice or information required to be given to the Trustee by a Beneficiary or Employer shall be deemed to be duly given if given in writing to the Trustee at the registered office of the Trustee. Any notice or information given by post shall be deemed to have been served at the time when it was posted and in proving such service it shall be sufficient to prove that the letter containing it was properly addressed and posted and a statement signed by the person giving the notice or information that it was so addressed and posted and when it was so posted shall be conclusive of that fact.

25.3 Making an application

An application or election required to be made to the Trustee under the Rules must be in writing signed by the person making it.

25.4 Timing of application

An election or application under the Rules is validly made if it is received at the registered office of the Trustee:

(a) if a day is specifically prescribed by or under the Rules or rules of the Trustee for the receipt of an election or application of that class, not later than on that day; or

(b) in any other case not later than at the end of the period of 2 months that next succeeds the vesting of the right to make the election or application.

25.5 The Trustee may accept late election or application

The Trustee may, subject to such terms and conditions as it may impose, accept an election or application which is not received at the registered office of the Trustee within the time prescribed by or under the Rules or rules of the Trustee if the Trustee is satisfied that, in all the circumstances, it is desirable that the election or application should be accepted. If the Trustee accepts a late election or application the Trustee may deal with it as if it had been received within the time prescribed.

25.6 When an election or application takes effect

An election or application under the Rules takes effect:

(a) if under the Rules or rules of the Trustee, a day is specifically prescribed for the taking effect of an election of the same class, on that day; or

(b) in any other case, on a day determined by the Trustee.

25.7 Amendment or revocation of election or application

An election or application under the Rules may, with the approval of the Trustee, be amended or revoked subject to such conditions as the Trustee may impose, which may include conditions as to:

(a) in the case of an amendment of an election, the day or days on which, or the manner in which, the election is to take effect; and

(b) in the case of revocation of an election, the day on which the revocation takes effect.

26. COPIES OF TRUST DEED

A copy of this Deed (but only including those Rules applicable to the Employer or Beneficiary seeking inspection) shall at all times during usual business hours be made available by the Trustee at the principal office of the Trustee for the inspection of Employers and Beneficiaries who shall be entitled to receive from the Trustee a copy of this Deed and those Rules applicable to that Employer or Beneficiary.

27. MISCELLANEOUS

27.1 Currency

All Benefits are expressed and paid in Australian currency unless expressly otherwise agreed by the Trustee with an Employer or Beneficiary.

27.2 Governing law

This Deed shall be governed by and construed in accordance with the law of New South Wales.

27.3 Indemnities

Each indemnity in this Deed is a continuing obligation and shall survive the termination of this Deed. It is not necessary for any person entitled to the benefit of an indemnity under this Deed to incur expense or make payment before enforcing a right of indemnity conferred by this Deed.

EXECUTED as a Deed in Sydney.

EXECUTED by
ENERGY INDUSTRIES SUPERANNUATION SCHEME PTY LTD under its common seal
in the presence of:

.....	.....
Signature	Signature
.....	.....
Print name	Print name
.....	.....
Office held	Office held

SIGNED SEALED and DELIVERED by the **HONOURABLE MICHAEL EGAN M.L.C., TREASURER** for and on behalf of **THE STATE OF NEW SOUTH WALES** in the presence of:

	.....
	Signature
.....	.....
Witness	Print name
.....	
Print name	

ANNEXURE A

Part 1

Nil

Part 2

- New South Wales Electricity Transmission Authority
- Australian Inland Energy Water Infrastructure
- Country Energy
- Energy Australia
- Integral Energy Australia
- Electrical Trades Union of Australia (New South Wales Branch)
- Electricity Association of New South Wales
- Snowy Mountains Hydro-Electric Authority
- Pacific Power
- Integral Energy Gas Limited
- Superannuation Services Company Pty Limited
- Energy Industries Superannuation Scheme Pty Limited
- Energy Industry Ombudsman (NSW) Limited
- Integral Energy Appliance Sales Pty Limited
- InfoMet Pty Limited
- Aurecon Australia Pty Ltd (formerly Connell Wagner Pty Limited)
- Coal Services Pty Limited
- Chifley Financial Services Limited
- FuturePlus Financial Services Pty Limited

ANNEXURE B

DEED POLL OF ADHERENCE

DEED POLL dated by:

1. *(Employer)*

RECITALS

A. By a deed of trust dated [*] ***(Trust Deed)*** a superannuation fund known as [*] **Superannuation Fund** ***(Fund)*** was established for the purpose of the provision of superannuation benefits for those persons who become Members of the Fund.

B. The Employer wishes to adopt the Fund for the purpose of the provision of superannuation benefits for those of its Employees who become Members of the Fund.

IT IS DECLARED as follows:

1. The Employer adopts the Fund for those of its Employees who become Members and agrees that it will in respect of each such Member whilst an Employee of the Employer contribute to the Fund such amounts as it is required to contribute under the Trust Deed and relevant Rules of the Fund.

2. The Employer agrees to be bound by the terms of the Trust Deed and undertakes to observe and perform in accordance with the Trust Deed such of the provisions of the Trust Deed as are applicable to an Employer.

3. The Employer shall pay the amount of all stamp duty due in respect of or as a result of the execution of this Deed of Adherence.

4. All words and expressions defined in the Trust Deed shall when used in this Deed of Adherence have the meaning ascribed to them in the Trust Deed.

EXECUTED as a Deed in


Ausgrid

AUSGRID ENTERPRISE AGREEMENT 2014 NEGOTIATIONS

Conditional Offer

26 November 2014

Ausgrid

AUSGRID'S INTERESTS

- Our overarching objective for the 2014 Enterprise Agreement is to safely improve competitiveness and productivity for the community we serve and to sustain jobs in an uncertain environment.
- Ausgrid's approach for achieving this is:
  - Safely improve productivity & competitiveness
  - Improve fairness of the Agreement across all employees
  - Modernise the Agreement including caps on salary maintenance, amendments to sick leave, revisions to the dispute settlement procedure and coverage clauses
- Unions and employees have told us securing jobs is their number one priority.

BACKGROUND

Current situation

- Current Agreement nominally expires on 18 December 2014
- Current Agreement has uncompetitive conditions, including the provisions for Long Service Leave and Salary Maintenance
- Lack of clarity and application of planned overtime

Negotiations to date

- Bargaining representatives have now formally met 9 times since 12 September 2014
- Management had provided an overview of the industry's current outlook
- All parties have tabled proposed changes
- Management conditional offer made on 26 November 2014 together with the "Without Prejudice" Draft EA2014

UNCERTAIN FUTURE

- Our regulator (the AER) will determine Ausgrid's 5 year revenue to fund capital and operating programs
  - Ausgrid's proposal to the AER included a 47% reduction in the capital program and a 4% increase in the operating program over the AER Determination period
  - AER will provide a Draft Determination by the end of November 2014
  - The AER's final determination in April 2015 will determine Ausgrid's revenue, operating and capital programs and resultant labour requirements for the period to 2018-2019

UNCERTAIN FUTURE

- Declining consumption from the grid

  - Prices will go up for customers unless costs are reduced

- AER determination will apply regardless of public or private ownership

Reduction in capital programs: - 47% Capital + 4% Operating	Declining consumption Approximately 0.4% p.a. until 2018/2019	Productivity vs Outsourcing	Reduced workforce demand

OBJECTIVES DRIVING THE CONDITIONAL OFFER

Safely improve productivity and competitiveness to sustain jobs	→	Competitiveness initiatives	Part A
Improve overall fairness of Enterprise Agreement across employees	→	Equity initiatives	Part B
Modernise Agreement content including classification structure and coverage clause	→	Modernise Agreement clauses	Part C

Ausgrid

SUMMARY OF CONDITIONAL OFFER

Conditional on the outcome of the AER Draft Determination due by the end of November.

Ausgrid is offering:

- A 2 or 3 year Agreement
- A continuation of no forced redundancy for the life of the Agreement

Part A - Wage/salary increase of up to 2.5% per annum for competitiveness initiatives

Part B - An additional wage/salary increase of 0.4% per annum for a package of equity initiatives

Part C - Modernise Agreement clauses

PART A

CONDITIONAL OFFER:
Competitiveness initiatives – up to 2.5% p.a.

FOR:

- Aligning Long Service Leave to industry standard
- Changes to Eligibility for Qualified Supervisor Allowance
- Changes to Overtime and on-call arrangements
- Modifying salary maintenance conditions

Base wage/salary increase up to 2.5% p.a.

Clause/Claim	Proposal
Long Service Leave	**Aligning Long Service Leave to the Industry Standard** The intention moving forward is to more closely align future Long Service Leave provisions with the Long Service Leave Act 1955 (NSW) and industry standards, namely a reduction from the current average of 2.6 weeks per annum accrual after fifteen years of service to 1.3 weeks per annum accrual from the commencement of the 11th years of service and onwards. The current accrual up to 10 years of service would be unaffected. This proposal still provides an entitlement above the entitlement outlined in the Act and more in line with industry standards.

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PART A

CONDITIONAL OFFER:
Competitiveness initiatives – up to 2.5% p.a.

Clause/Claim	Proposal
Qualified Supervisor Electrical Work Allowance	Limitation of the allowance to those employees that are required by Ausgrid to be licensed and consistent with relevant legislation.
Overtime and On Call Arrangements	Amend the overtime and on call arrangements to provide for: • Payment for overtime and call out to commence when the job starts and ends when the job finishes. • Travel time for unplanned overtime as well on-call, call out work to be payed at ordinary rates rather than at overtime rates. • No travel time payment for continuous or planned overtime

CONDITIONAL OFFER:
Competitiveness initiatives – up to 2.5% p.a.

PART A

Clause/Claim	Proposal
Salary Maintenance	Revise the Salary Maintenance Policy and Redundancy and Redeployment MOU to allow salary maintenance to continue for a period of 6 months from the date the employee is notified of their excess status. Where a redeployee has not been redeployed into a suitable alternative role within the 6 month period they will be entitled to the rate of pay from their former position. Where a redeployee is redeployed to a lower graded position after the 6 month period, the rate of pay of the lower graded position would apply from the date of redeployment. When an employee is formally found to be excess to current requirement their rate of pay will not be subject to any increases for the period that they are covered by the Policy. Ausgrid will actively place redeployees into suitable alternative positions. Clearance of annual and long service leave will occur.

Ausgrid

PART B

CONDITIONAL OFFER:
Equity initiatives – 0.4% p.a. for package

The following are offered as a package:

- Freeze ESRA and cease it as an all-purpose allowance
- Cease the Qualified Supervisor Electrical Allow. (QSEWA) as an all-purpose allowance
- Equalise the superannuation top-up for both Defined Benefits & Accumulation fund employees
- Reduce minimum payment for callout and planned overtime from 4 to 2 hours

Base wage/salary increase of 0.4% p.a. for package

Ausgrid

PART B

CONDITIONAL OFFER:
Equity initiatives – 0.4% p.a. for package

Clause/Claim	Change and Justification
Electrical Safety Rules Allowances	Freeze ESRA at the current rate of $129.89 per week for the duration of the Enterprise Agreement and cease it as an all-purpose allowance. This is an allowance paid to electrical employees who have passed the Electrical Safety Rules test and knowledge of the rules and are required to work, supervise or direct that work. There is no justification for paying this at a higher rate during overtime or when work is not being performed.
Qualified Supervisor Electrical Work Allowance	Cease the Qualified Supervisor Electrical Work Allowance as an all purpose allowance. This is an allowance paid to employees who hold a current NSW qualification for Supervisor Electrical Work. There is no justification for paying this at a higher rate during overtime or when work is not being performed.

PART B

CONDITIONAL OFFER:
Equity initiatives – 0.4% for package

Clause/Claim	Change and Justification
Superannuation	**Equalise the superannuation top-up** To ensure a more equitable Agreement. The employer funded top up contributions for employees within the Defined Benefits Scheme would be capped at 5.5.% to align with the 5.5% top up received by members of the accumulation scheme and adjusted in line with movements in the SGC in accordance with legislated requirements.
Overtime call out & planned overtime	**Reduce minimum payment for callout & planned overtime from 4 hours to 2 hours** When an employee is called out or performs planned overtime they receive appropriate penalty rates in recognition of work undertaken outside of ordinary hours. Reducing the minimum payments from 4 hours to 2 hours paid at penalty rates continues to provide financial recognition for being called out, whilst ensuring that those occasions where minimal work is required, a fair and reasonable payment is made. Further Ausgrid would introduce a new one hour minimum payment when an employee is working outside of ordinary hours without returning to the job.

PART B

CONDITIONAL OFFER:
Equity initiatives – 0.4% p.a. for package

Clause/Claim	Change and Justification
Consolidation of allowances	Removal of miscellaneous allowances apart from the sustenance allowance, qualified supervisor electrical work allowance, electrical safety rules allowance and first aid allowance. The removal is on the basis of some allowances being redundant and others being removed to ensure equity.
Removal of Performance Bonus P&MS	Remove the performance bonus available to Professionals, Managers and Specialists based on achieving performance targets. There is no basis to differentiate performance for PM&S employees as opposed to other employees covered by the Agreement.

Ausgrid

PART C

CONDITIONAL OFFER:

Modernise Agreement clauses - no wage impact

- **Union payroll deductions** – remove management visibility on union membership by ceasing payroll deductions for union dues
- **Annual leave balance** – move towards the NSW Treasury Office requirement to reduce excess annual leave balances by:
  - managing annual leave balances throughout the year to be less than 6 weeks at any time on an accrual basis.
- **Dispute Resolution Procedure –** changing arrangements related to the application of the status quo provisions.
- Other changes to ensure **legal compliance** for example removal of references to LWFA clauses, etc.
- The dispute before the Fair Work Commission will resolve the **Coverage** clause. The 2014 agreement will reflect the dispute outcome.

PART C

CONDITIONAL OFFER:

Modernise Agreement clauses - no wage impact

- **Individual Flexibility Agreements** – broaden the areas that employees and Ausgrid may agree on to provide for individual flexibility arrangements.
- **Removal of Annual leave at half pay** – remove the ability for employees to apply and for Ausgrid to approve annual leave at half pay.
- **Removal of Accident Pay provisions –** remove the provisions relating to accident pay to provide a greater reflection of the intent of the 2012 changes to the Workers Compensation laws.
- **Delete Schedules 3 and 4** and incorporate Schedules 1 and 2 into the Agreement. Schedule 5 will remain attached for clarity.

IMPORTANT BUT DIFFICULT DECISION

- This is an important but difficult choice for our people
- We’re facing a challenging future:
  - AER’s decision
  - Declining consumption
- Safely increasing productivity and competitiveness is the best way to improve job security

NEXT STEPS

- 26 November – Ausgrid offer made conditional on AER's Draft Determination
- End November – AER releases Draft Determination and Benchmarking Report
- 3 December- Unions (including delegates) and individual bargaining representatives meet to consider conditional offer
- Union delegates seek employees feedback from their areas
- 10 December – Bargaining Committee meets to:
  - Receive employees and individual bargaining representatives feedback on the conditional offer via delegates and individual bargaining representatives
  - Discuss implications of the AER's Draft Determination

Without Prejudice Draft

26 November 2014

Ausgrid

Agreement 2014

Table of Contents

1. TITLE

This Agreement is to be known as the Ausgrid Agreement 2014.

2. COVERAGE

2.1 [subject to separate discussions]

3. DEFINITIONS

3.1 **"Appointed Position"** means the position to which an employee has been appointed by the Chief Operating Officer (or his or her delegate) other than under the provisions of Clause 40, Higher Grade Pay.

3.2 **"Day Off"** means a day off in accordance with a regular nine day fortnight working period arrangement.

3.3 **"Certification"** means the date on which this Agreement is certified by the Fair Work Commission.

3.4 **"Chief Operating Officer"** means the Chief Operating Officer of Ausgrid.

3.5 **"Engineer"** has the meaning outlined in clause 44.1.2 of this Agreement.

3.6 **"Medical Officer"** unless specified otherwise, means Ausgrid's Medical Officer or a medical practitioner acting on Ausgrid's behalf.

3.7 **"NES"** refers to the Nation Employment Standards under the *Fair Work Act 2009* (Cth).

3.8 **"Ordinary Rate of Pay"** as defined in the *Fair Work Act 2009* (Cth) section 16 (1) as "base rate of pay", means the rate of pay payable to the employee for his or her ordinary hours of work, but not including any of the following:

3.8.1 Incentive-based payments and bonuses;

3.8.2 Loadings;

3.8.3 Monetary allowances;

3.8.4 Overtime or penalty rates; and

3.8.5 Any other separately identifiable amounts.

3.9 **"Professional Manager and Specialist"** has the meaning outlined in clause 43.1.2 of this Agreement.

3.10 **"Resignation"** means voluntarily leaving the service of Ausgrid.

3.11 **"Retirement-Age"** means termination of service in accordance with Sub-clause 35.4.

3.12 **"Retirement-Ill Health"** means terminating of service by Ausgrid on account of ill-health, it being certified by Ausgrid's Medical Officer, or a medical practitioner as agreed between the Chief Operating Officer and the Secretary of the Union concerned, that such ill-health renders the employee unable in the future to perform the duties of the employee's Appointed Position or equivalent.

3.13 **"Requisite Legislation"** means the following Acts and Regulations:

3.13.1 *Home Building Act 1989;*

3.13.2 *Home Building Regulation 2004;*

3.13.3 *Electricity (Consumer Safety) Act 2004;and*

3.13.4 *Electricity (Consumer Safety) Regulation 2006.*

3.14 **"Rostered Day Off"** means a day off for a shift worker under a shift work roster; or for a day workers, means a week day Monday to Friday on which the employee is not required to work because the employee has worked additional time which has accrued towards a day off.

3.15 **"Service"** means service calculated in accordance with provisions of Clause 36, Calculation of Service.

3.16 **"Span of Hours"** means from 0600 hours to 1800 hours.

3.17 **"Trade Classifications"** are occupational groups whose members are required to serve an apprenticeship.

3.18 **"Part-time Employee"** means an employee who is engaged for less than full time ordinary hours as prescribed by the Agreement, with regular days and number of hours each week.

3.19 **"Casual Employee"** means an employee who is engaged to work on an hourly or daily basis, with a minimum engagement of three (3) hours.

4. DISPUTE SETTLEMENT PROCEDURE

4.1 Objectives

The objective of the dispute settlement procedure is to ensure:

(a) disputes are resolved at their source and at the lowest possible level;

(b) employees address the issue with their supervisor first;

(c) the dispute remains in the part of the organisation concerned without interference from employees not involved; and

(d) While the dispute settlement procedure is being conducted, work must continue in accordance with this Agreement and the Fair Work Act and, without prejudice to either party, work shall continue in the manner and under the conditions it was carried out prior to the dispute arising.

(e) The objective of this DSP is to ensure that disputes relating to the relationship between the employer and employees are dealt with according to this clause.

4.2 Three Tiered System

TIER	LOCAL MATTER	CORPORATE WIDE MATTER
Tier 1 Local Level	Resolution of the issue or dispute is sought at its source with involvement of the following: • supervisor with manager (if required) • employee/s concerned with union	

	delegate (if requested).	
Tier 2 Corporate Level	If unresolved at local level, resolution is sought at a corporate level with involvement of the following: • Union Organiser, relevant local Delegate and Employee/s (if necessary) • Manager/s affected, local manager/s, General Manager People & Services and Manager Employee Relations.	Claims or issues may be raised by either: • Employee/s, • Union/s, or • Ausgrid Resolution of the issues raised should involve: • Relevant member/s of Ausgrid Management and any other necessary resources, and • Union's Organisers and relevant Delegates to ensure input reflects the organisation or the issues raised.
Tier 3 Tribunal Level	If the issues remain unresolved the matter may be referred to the Fair Work Commission for conciliation and or arbitration with the rights of the parties to appeal being reserved. The process before the Fair Work Commission must be free from industrial action. The parties may agree that a person other than the Fair Work Commission can deal with a dispute in accordance with section 740 of the Fair Work Act 2009. In the absence of such agreement, the dispute will be dealt with by the Fair Work Commission.	If the issues remain unresolved the matter may be referred to the Fair Work Commission for conciliation and or arbitration with the rights of the parties to appeal being reserved. The process before the Fair Work Commission must be free from industrial action. The parties may agree that a person other than the Fair Work Commission can deal with a dispute in accordance with section 740 of the Fair Work Act 2009. In the absence of such agreement, the dispute will be dealt with by the Fair Work Commission.

Each tier of the system will be managed in a timely fashion.

4.3 Responsibilities of those Involved in Resolving the Dispute

The responsibilities of the individuals and the organisations they represent should include the following:

(a) to have an appreciation of each other's point of view;

(b) to have an appreciation of each other's needs;

(c) to approach discussions and negotiations in good faith;

(d) Ausgrid, where possible, should take the needs of employees into account when making decisions;

(e) meetings called to try and resolve the issues in dispute should be called without unnecessary delay; and

(f) it is the responsibility of both the representatives of the Union/s and Ausgrid to give the employees progress reports.

5. CONSULTATION

5.1 This term applies if:

5.1.1 Ausgrid has made a definite decision to introduce a major change to production, program, organisation, structure, or technology in relation to its enterprise; and

5.1.2 the change is likely to have a significant effect on employees of the enterprise.

5.2 Ausgrid must notify the relevant employees of the decision to introduce the major change.

5.3 The relevant employees may appoint a representative for the purposes of the procedures in this term.

5.4 If:

5.4.1 a relevant employee appoints, or relevant employees appoint, a representative for the purposes of consultation; and

5.4.2 the employee or employees advise Ausgrid of the identity of the representative;

Ausgrid must recognise the representative.

5.5 As soon as practicable after making its decision, Ausgrid must:

5.5.1 discuss with the relevant employees:

5.5.1.1 the introduction of the change; and

5.5.1.2 the effect the change is likely to have on the employees; and

5.5.1.3 measures Ausgrid is taking to avert or mitigate the adverse effect of the change on the employees; and

5.5.2 for the purposes of the discussion--provide, in writing, to the relevant employees:

5.5.2.1 all relevant information about the change including the nature of the change proposed; and

5.5.2.2 information about the expected effects of the change on the employees; and

5.5.2.3 any other matters likely to affect the employees.

5.6 However, Ausgrid is not required to disclose confidential or commercially sensitive information to the relevant employees.

5.7 Ausgrid must give prompt and genuine consideration to matters raised about the major change by the relevant employees.

5.8 If a term in the enterprise agreement provides for a major change to production, program, organisation, structure or technology in relation to the enterprise of Ausgrid, the requirements set out in subclauses 5.2, 5.3 and 5.5 are taken not to apply.

5.9 In this term, a major change is ***likely to have a significant effect on employees*** if it results in:

5.9.1 the termination of the employment of employees; or

5.9.2 major change to the composition, operation or size of the employer's workforce or to the skills required of employees; or

5.9.3 the elimination or diminution of job opportunities (including opportunities for promotion or tenure); or

5.9.4 the alteration of hours of work; or

5.9.5 the need to retrain employees; or

5.9.6 the need to relocate employees to another workplace; or

5.9.7 the restructuring of jobs.

5.10 In this term, ***relevant employees*** means the employees who may be affected by the major change.

5.11 Peak Consultative Committee ("PCC")

5.11.1 The PCC will be established comprising the relevant Senior Executives, Managers of Divisions, Union Officials and Employee representatives to consult with respect to the specific issue/s.

5.11.2 These meetings will focus on but are not limited to, organisational change and workplace reform.

5.11.3 If a matter raised at the PCC is under consideration at another Committee, it may be noted at the PCC.

5.11.4 The PCC shall meet on at least a quarterly basis or on an as need basis; however, members of the PCC shall be afforded a minimum of one (1) weeks notice of any proposed meeting.

5.11.5 The PCC shall have an independent Chair agreed by the PCC members and members shall participate in appropriate training to fulfil their duties. A charter shall be developed by the PCC members and agreed.Other management representatives and union officials are ex-officio members of this committee.

5.12

6. OUTSOURCING/CONTRACTING OUT

6.1 Basic Principles:

Outsourcing or contracting out will not diminish the working conditions of this Agreement.

6.2 Work will only be outsourced or contracted out when it can be demonstrated that:

6.2.1 peak workloads cannot be met by Ausgrid's workforce including reasonable overtime; or

6.2.2 where specific expertise, not available in Ausgrid's workforce, is required. Where recurring work requires such expertise, Ausgrid will make efforts to obtain this expertise by training and/or reorganising its existing workforce. Ausgrid will keep the relevant union(s) informed about such training and reorganisation; or

6.2.3 the use of outsourcing or contracting out the work is commercially the most advantageous option taking into account safety, quality, performance, and cost.

6.3 In circumstances where Ausgrid is examining outsourcing or contracting out of work activities:

6.3.1

6.3.2 The PCC will serve as a forum for Ausgrid to inform and consult the unions and their members about contracting out and outsourcing proposals; Ausgrid will advise the employees and their union(s) and provide them the appropriate time (relevant to the nature of the proposal) to respond with suitable proposals in respect of possible alternative arrangements to outsourcing or contracting out;

6.3.3 The persons covered by this Agreement including relevant work groups/employees may, via the consultative process in this Agreement, utilise external benchmarking prior to market testing to permit internal efforts to improve efficiencies and become more competitive. Prior to expressions of interest or tenders being called, where employee generated alternatives are received, such alternatives will be considered;

6.3.4 Expressions of interest or tenders when advertised shall be timed so as to provide the employees with an opportunity to submit a conforming expression of interest or tender. If an employee generated conforming expression of interest or tender is submitted, it will be evaluated together with external submissions consistent with the tendering and probity procedures of Ausgrid.

6.3.5 If it is subsequently determined that expressions of interest or tenders are to be invited, Ausgrid will provide the union(s) with a copy of the document which has been prepared.

6.3.6 In evaluation of conforming expressions of interest or tenders, any comparisons will be made on a basis discounting any overheads that would continue even if the work was outsourced or contracted out. Such overheads would typically include tendering costs, contact administration, contract supervision and the cost of any redundancies which may arise as a result of the decision to outsource or contract out.

6.4 When a decision is made by Ausgrid to outsource/contract out work not already outsourced or contracted out, or in a review of existing contracts, Ausgrid will consider a contract to a contractor that demonstrates:

6.4.1 contractor(s) undertaking the outsourced /contracted out work will have wages and conditions that are no less favourable than that provided for in the contractor's relevant industrial instrument.

6.4.2 it has established appropriate industrial relations policies and practices which promote harmonious employee relations and minimise the risk of industrial disputes and that it complies with appropriate safety standards, environmental standards and quality standards to a level commensurate with the standards Ausgrid expects.

6.4.3 if after engagement of a contractor a person covered by this Agreement provides sufficient evidence that a contractor is not providing its employees with correct statutory entitlements, Ausgrid will use an independent organisation to audit compliance with these entitlements. If the audit confirms that there is a breach of the statutory entitlements of the Contractor's employees, Ausgrid will take appropriate action.

6.5 In the event that Ausgrid has determined to outsource or contract out work, affected employees will have access to the full range of options available under all relevant Ausgrid policies which apply at the time. These options will include training and / or retraining.

6.6 Any person covered by this Agreement may refer this process to the Dispute Settlement Procedure in this agreement.

6.7 The persons covered by this Agreement will comply with their obligations under clause 5 of this Agreement prior to enacting the above. Nothing in this clause diminishes the obligations under clause 5.

6.8

7. TRAINING AND CLASSIFICATIONS

7.1 All Competency/Skill-based classification structures will:

7.1.1 provide the basis for pay and progression linked to the acquisition and use of skills within the scope of the classification;

7.1.2 enhance the opportunities for workplace flexibility,

7.1.3 meet the needs of the organisation,

7.1.4 address the joint requirements of improved productivity, quality and performance, and development opportunities for individuals.

7.2 Changes to an employee's work shall not justify an increase in pay unless the change in the work constitutes such a significant net addition to the work requirements that it warrants creation of or advancement to a new classification. Changes in work value can only arise from changes in the nature of work, the level of skill required or the level of responsibility exercised.

7.3 The persons covered by this Agreement agree there will be no further claims for skills structure reviews with work-value related effect.

7.4 It is recognised that skill and learning differences between specific work areas or locations will exist despite organisation wide requirements for fairness and employee mobility.

7.5 The parties to this Agreement acknowledge that Ausgrid has the ability to create new classifications within Appendix 1C.

7.6 Whether or not a job warrants reclassification shall be determined by the Manager Human Resource Operations in consultation with relevant persons.

7.7 Competency/Skills-based classification structures will be progressively developed and refined, in line with work and job design, which recognises organisational and employee needs.

7.8 Supporting Mechanisms

7.8.1 To support the competency/skills-based classification structures, employees may be given the opportunity to become skilled in:

7.8.1.1 Workplace Training (the delivery of workplace training);

7.8.1.2 Skill Module Development (the design of competency-based modules);

7.8.1.3 Workplace Assessment (the assessment of competency against agreed competency standards); and

7.8.1.4 reading, writing, numeracy and spoken communication.

7.8.2 The identification of competency/skill development requirements will be assisted by Ausgrid's performance development system.

7.9 Learning Time

7.9.1 On and off the job learning opportunities will be available to employees to meet the training needs of the organisation.

7.9.2 Wherever practicable, this will take place in normal working time.

7.9.3 Where learning and skill development takes place out of hours, employee family commitments will be taken into consideration.

7.9.4 Payments for learning undertaken outside normal hours will be determined on a case by case basis, prior to commencement of the program. However, when it is agreed, where such training is linked to a competency/skills based structure, payments will be made at the rate agreed between the persons covered by this Agreement, not to be less than ordinary rates.

7.9.5 Penalty rates shall apply to all management-directed and/or regulatory training that occurs outside normal working hours.

8. WAGES & SALARIES

8.1 Employees covered by this Agreement as classified in Appendix 1C are to be paid the appropriate Ordinary Rate of Pay according to their approved pay point as per Appendix 1. Ordinary rate of Pay under this agreement will increase as shown in the table below.

Date	On Certification	12 months after Certification	24 months after Certification
Percentage	%	%	%

8.2 The Ordinary Rate of Pay set out in Appendices 1 include an "Ausgrid Allowance". This is set as shown in the table below:

Date	On Certification	12 months after Certification	24 months after Certification
Amount per week	$	$	$

The payment of such allowance is to take into account the performance of work in relation to heat, height, dirty work, work in confined spaces; work subject to climatic conditions; subject to the lack of the usual amenities and facilities; subject to directions for alterations and variation of starting and/or finishing locations; subject to direction for availability for emergency work outside of ordinary working hours to ensure continuity and for availability for supply; subject to requirements to complete proficiency tests and subject to changes in the system of working.

9. METHOD OF PAYMENT

9.1 Employees shall be paid by direct transfer to a maximum of five major financial institutions, with a registered BSB number.

9.2 Employees shall be paid weekly on the agreed day.

9.3 On termination employees will be paid all wages and entitlements on the date of termination or by agreement.

10. ALLOWANCES

10.1 The Allowances provided for under this clause 10 are not included in the Ordinary Rate of Pay.

10.2 Qualified Supervisor Electrical Work Allowance

10.2.1 Subject to clauses 10.2.2 and 10.2.3, an employee is entitled to receive the Qualified Supervisor Electrical Work Allowance, as outlined at Appendix 1D Allowances Item No. 18, if the employee:

10.2.1.1 holds a current NSW Qualified Supervisor Certificate; and

10.2.1.2 is required to hold a current NSW Qualified Supervisor Certificate under Requisite Legislation to fulfil their duties.

10.2.2 In order to receive the allowance, employees must, upon the renewal of their NSW Qualified Supervisor Certificate, provide Ausgrid with evidence that their NSW Qualified Supervisor Certificate is current. Ausgrid may also request this information from time to time.

10.2.3 For the purpose of 10.2.1.2, whether the employee is required to hold a current NSW Qualified Supervisor Certificate under Requisite Legislation will be determined by Ausgrid periodically.

10.3 Electrical Safety Rules and Skills Allowance ("ESRA")

10.3.1 Subject to clauses 10.3.4, 10.3.5 and 10.3.6, an employee is entitled to receive ESRA, as outlined at Appendix 1D, Allowances, Item No. 15, if they:

10.3.1.1 are appointed to an electrical position;

10.3.1.2 have passed the Electrical Safety Rules Test;

10.3.1.3 successfully undertake refresher training on the Electrical Safety Rules as and when required by Ausgrid; and

10.3.1.4 are required to work or supervise or direct work in accordance with those rules.

10.3.2 Once an employee no longer meets the requirements set out at 10.3.1, they will cease to receive ESRA.

10.3.3 ESRA is paid at the rate paid as at 16 June 2012.

10.3.4 Subject to clause 10.3.1, effective on and from 19 December 2000, apprentice electricians are paid ESRAfrom the date they complete the Electrical Safety Rules Test.

.

10.3.5

10.3.6 Subject to clause 10.3.1, employees in trade classifications (as defined) other than electricians are entitled to 80% of the Electrical Safety Rules Allowance paid to electricians as outlined at Appendix 1D, Allowances, Item No. 17 if they are required by Ausgrid, as determined by Ausgrid from time to time, to successfully pass the Electrical Safety Rules Test in order to fulfil their position.Subject to clause 10.3.1, Electricity Supply Operatives who have passed an abridged version of the Electrical Safety Rules Test are entitled to 60% of ESRA paid to electricians as set out at Appendix 1D, Allowances, Item No. 16.

10.4 Sustenance Allowance

10.4.1 Where an employee is required to work at a location which is not their usual place of work and are required to stay overnight, and when arrangements have not been made for accommodation, meals and/or general out of pocket expenses paid in advance by Ausgrid then the employee shall be paid the sustenance allowance rate outlined in Appendix 1D, Extra Rates, Item No. 13.

10.4.2 Application of this clause will be provided to the employee in writing prior to the employee being required to work at a location that is not their usual place of work, including an overnight stay.

10.5 First Aid Attendant Allowance

10.5.1 An employee is entitled to receive the First Aid Attendant Allowance as outlined at Appendix 1D, Allowances, Item No. 24, if they:

10.5.1.1 hold a current recognised first aid certificate;

10.5.1.2 are designated by Ausgrid as a First Aid Attendant; and

10.5.1.3 carry out the duties as required by Ausgrid of a First Aid Attendant.

10.5.2 In order to receive the allowance, employees must, upon the renewal of their first aid certificate, provide Ausgrid with evidence that their first aid certificate is current. Ausgrid may also request this information from time to time.

10.5.3 For the purpose of 10.11.1.2, whether an employee is designated a First Aid Attendant will be reviewed and determined by Ausgrid from time to time.

10.6 Occupational First Aid Attendant Allowance

10.6.1 An employee is entitled to receive the Occupational First Aid Attendant Allowance as outlined at Appendix 1D, Allowances, Item No. 25, if they:

10.6.1.1 have successfully completed a current WorkCover approved occupational first aid attendant course and advanced resuscitation certificate;

10.6.1.2 maintain the qualifications above at 10.12.1.1 as required by WorkCover;

10.6.1.3 are designated by Ausgrid as an Occupational First Aid Attendant; and

10.6.1.4 carry out the duties as required by Ausgrid of an Occupational First Aid Attendant.

10.6.2 In order to receive the allowance, employees must, upon the renewal of their qualifications, provide Ausgrid with evidence that their qualifications are current. Ausgrid may also request this information from time to time.

10.6.3 For the purpose of 10.12.1.3, whether an employee is designated an Occupational First Aid Attendant will be reviewed and determined by Ausgrid from time to time.

11. PRODUCTIVITY AND WORK PRACTICE DEVELOPMENT

11.1 Productivity and work practice development is the foundation of Ausgrid continuing to be a safe workplace and reliable supplier to our customers.

11.2 Ausgrid, its employees and the Unions covered by this Agreement (refer Sub-clause 2.1) understand that the adoption of new technology and regular review of work processes and, when identified, the removal of inefficient or redundant activities constitutes a vital element in improving Ausgrid's business objectives and are committed to seeking continuous improvement in all that we do.

11.3 Ausgrid, its employees and the Unions covered by this Agreement undertake to achieve Australia's best practice and business success through increased productivity measured in terms of safety, timely completion of work, quality and cost.

12. HOURS OF WORK

12.1 This clause applies except in the case of employees appointed as Professionals, Managers and Specialists in which case clause 43 applies.

12.2 Ordinary Hours

12.2.1 The persons covered by this Agreement agree that it is essential that sufficient employees be scheduled on to meet the business and customer service requirements in each workplace.

12.2.2 The hours of work for individual employees, including starting and finishing times, will be scheduled by Ausgrid after consultation with the individual employee and their manager which will take into consideration:

12.2.2.1 the provision of service;

12.2.2.2 the work of the branch, section or team; and

12.2.2.3 the personal circumstances of the employees, including parental and carer's responsibilities.

12.2.3 Individual schedules will not be altered so often that would be disruptive to the work organisation and employee's home lives.

12.3 Maximum Hours to be Worked

12.3.1 Full time employees will not be required to work in excess of 72 hours in any fortnight, except as overtime.

12.3.2 Employees will not be required to work in excess of 12 hours a day without receiving overtime in terms of Clause 14 Overtime.

12.4 Span of Hours

12.4.1 The span of hours shall be 0600 hours to 1800 hours. Subject to clause 12.2 and any Individual Flexibility Arrangement entered into with an employee under clause 22, Ausgrid can direct employees to work within this span of hours.

12.5 Normal Working Week

12.5.1 The normal method of scheduling hours will provide for a nine day fortnight.

12.5.2 Alternative patterns of work may include patterns such as 12 hour day/six day fortnight, nine hour day/eight day fortnight, etc.

12.6 Flexibility

12.6.1 The scheduled start and finish times and duration of the working day can be altered on a casual basis by Ausgrid or by the employee with Ausgrid's approval to meet unforeseen changes in the workflow or to meet the personal needs of the employee.

12.6.2 A written record of these casual arrangements must be kept by the Manager.

12.6.3 In these cases, the total ordinary hours should not exceed 72 over two weeks. Also, in these cases, work in excess of 12 hours per day or after 1800 hours, or on a Saturday, Sunday or Agreement/Public Holiday will still attract the appropriate penalty rates.

13. SHIFT WORK

13.1 Definitions

13.1.1 **"Shift Work"** – work which is:

13.1.1.1 rostered outside the Span of Hours;

13.1.1.2 which provides for two or more shifts on a day; and

13.1.1.3 which requires employees to rotate or alternate in working the shifts.

13.1.2 **"Shift Worker"** is an employee who works shifts. An employee does not cease to be a shift worker during a period of leave for the purposes of determining accrued leave entitlements, pursuant to Clause 23.

13.1.3 **"Afternoon Shift"** is a shift finishing between 1800 and 2400 hours.

13.1.4 **"Early Morning Shift"** is a shift commencing between 0500 and before 0630 hours.

13.1.5 **"Seven Day Shift worker"** is a shift worker who is rostered to work on each day of the week and to be clear is a shift worker for the purposes of the Fair Work Act 2009 NES. Seven Day Shift workers are paid the rates in Appendix 1B.

13.1.6 **"Night Shift"** is a shift finishing between 2400 and 0800 hours.

13.2 Shift Allowance

Shift workers shall be paid the extra rates in Appendix 1D, Extra Rates, Items 1, 2 and 3. Extra rates are made on a pro rata basis for rostered shifts greater than eight hours (e.g. a nine (9) hour rostered shift receives 1.125 times the extra rate, a 12 hour rostered shift receives 1.5 times the extra rate).

13.3 Shift Penalty Rates

Penalty Rates shall be paid for shift work on Saturdays, Sundays and Agreement/ Public Holidays.

Penalty rates for all time worked during an ordinary shift on:

13.3.1 Saturday – Time and one half of the shift hours,

13.3.2 Sunday – Double Time, and

13.3.3 Agreement/Public Holiday – Double Time and an ordinary day's pay.

13.4 Change of Roster

13.4.1 Shift workers should normally be given at least five (5) days' notice of a change of shift or a change of roster. Where this is not possible the employee will be paid double time for the first shift after the change.

13.4.2 Where an employee is given less than five (5) days' notice of a change of shift or roster and the change results in the employee working additional shifts, then the employee shall be allowed an equal amount of time off at a mutually agreed time. If it is not practical for the employee to be allowed time off within four (4) weeks, the employee shall be paid for the extra shifts at double time.

13.4.3 The provisions in 14.4.1 and 14.4.2 above do not apply to employees who are classified as relief shift workers.

13.5 Day workers who are required to work shifts

13.5.1 Day workers may be required to work shifts.

13.5.2 Day workers who are required to work shifts shall be paid not less than an additional 30 per cent for the first ten (10) afternoon and/or night shifts in lieu of the shift allowance. The shift allowance is still payable where the shifts occur on a Saturday, Sunday or Agreement/Public Holiday.

13.5.3 After working ten (10) consecutively rostered afternoon and/or night shifts, unbroken by a return to normal day work, an employee shall be deemed to be a shift worker.

13.5.4 The additional payments in Sub-clause 13.5.2 do not apply where a day worker is appointed to shift work at the employee's own request, or as a result of having applied for and obtained a permanent position involving shift work.

13.6 **"Continuous Afternoon or Night Work"** is work that is performed continuously in the afternoon or night. A person working continuous afternoon or night work is not considered to be a shift worker as defined above at 13.1.2.

13.6.1 A day worker who is required to commence working continuous afternoon or night work shall be paid for the first five (5) shifts at time and a half or at the rate otherwise provided in this Agreement, whichever is the greater. These shifts may be organised so that an employee receives at least a full week's pay.

13.6.2 After working five (5) consecutively rostered continuous afternoon or night shifts, unbroken by a return to normal day work, the employee is deemed to be a continuous afternoon or night worker.

13.6.3 An employee engaged on continuous afternoon work or continuous night work as defined in this Agreement, who works on:

13.6.3.1 any day other than an Agreement/Public Holiday shall be paid ordinary rates plus 30% for all time worked;

13.6.3.2 an Agreement/Public Holiday shall be paid ordinary rates plus 30% for all time worked in addition to an ordinary day's pay.

13.6.4 The additional payments in Sub-clause 13.6.1 do not apply where a day worker is appointed to shift work at the employee's own request, or as a result of having applied for and obtained a permanent position involving shift work.

13.6.5 An employee engaged in Continuous Afternoon or Night Work may be directed to change to day work.

14. OVERTIME

14.1 This clause applies except in the case of employees appointed as Professionals, Managers and Specialists in which case clause 43 applies.

14.2 Overtime Hours

14.2.1 All time worked in excess of the scheduled ordinary hours shall be overtime unless:

14.2.1.1 the employee and the manager have altered them by agreement on a casual basis in accordance with clause 12 Hours of Work; or

14.2.1.2 the employee is a Part-time Employee in which clause 18.4 applies.

14.2.2 In the case of day workers, all time worked outside the period 0600 – 1800 hours Monday to Friday shall be overtime.

14.2.3 In the case of shift workers, work on a scheduled day off shall be overtime.

14.3 Reasonable Overtime

Subject to Sub-clause 15.1.1, Ausgrid may require an employee to work reasonable overtime at overtime rates.

14.3.1 An employee may refuse to work overtime in circumstances where the working of such overtime would result in the employee working hours which are unreasonable having regard to:

14.3.1.1 any risk to the employees' health and safety

14.3.1.2 the employee's personal circumstances including any family responsibilities

14.3.1.3 the needs of the workplace

14.3.1.4 the notice (if any) given by Ausgrid of the overtime and by the employee of his or her intention to refuse it, and

14.3.1.5 any other relevant matter.

14.4 Overtime rates

14.4.1 The following overtime rates, calculated using the Ordinary Rate of Pay, shall apply to employees who are not On Call and work Overtime Hours:

OVERTIME SITUATION	RATE APPLICABLE
Over time commenced Monday to Friday	First two hours at time and a half. Additional hours at double time.
Overtime commenced between midnight Friday and midday Saturday	First two hours at time and a half. Additional hours at double time.
Overtime commenced between midday Saturday and midnight Sunday	All hours paid at double time.
Overtime commenced on a Public Holiday or Agreement Holiday	All hours paid at double time and a half until the employee finishes.
In the case of day workers, all work done on a Public Holiday or Agreement Holiday during the time which would have been the employee's normal working hours	Triple time.
In the case of shift workers, all overtime worked on a day which they are rostered off. (Note: shift workers are not entitled to overtime as a result of changed shifts which they organise amongst themselves)	Double time until released from duty.

14.4.2 For the overtime rates applicable to employees On Call see clause 15.

14.5 No payment will be made for unauthorised overtime.

14.6 Continuous Overtime

14.6.1 Continuous Overtime is where an employee:

14.6.1.1 Works Overtime Hours starting directly before the start of an ordinary day of work;

14.6.1.2 Works Overtime Hours starting directly after an ordinary day of work; or

14.6.1.3 Works Overtime Hours directly before AND after an ordinary day of work.

14.6.2 When an employee works Continuous Overtime both before and after their rostered or ordinary shift, the Continuous Overtime hours are added together to determine the overtime rates applied.

14.6.3 Continuous Overtime is paid at the Overtime Rates outlined in clause 14.4.

14.6.4 Time paid commences when the employee commences working overtime and continues until the overtime ceases.

14.6.5 Employees are not paid for any travelling time for Continuous Overtime.

14.6.6 There are no minimum hours for Continuous Overtime.

14.7 Deemed Continuous Overtime

14.7.1 Where an employee is given a direction, while still at work, to commence overtime within 2 hours of their usual starting time, or 1 hour after their usual finishing time, this is considered Continuous Overtime and the provisions of clause 14.5 apply.

14.8 Unplanned Overtime

14.8.1 Unplanned Overtime is where an employee:

14.8.1.1 is not On Call; and

14.8.1.2 is notified of working overtime after the completion of the employee's day of work; and

14.8.1.3 works Overtime Hours.

14.8.2 Unplanned Overtime is paid at the Overtime Rates outlined in clause 14.4.

14.8.3 A minimum of 2 hours will be paid for Unplanned Overtime.

14.8.4 If an employee is called to a second job within the 2 hours, they will be paid for a minimum of 2 hours only (not an additional 2 hours).

14.8.5 The payment for an employee who works Unplanned Overtime commences from the time the employee commences working on the job until the employee ceases working on the job.

14.8.6 An employee who works Unplanned Overtime is paid for the time spent travelling from the employee's home to the job and return at the Ordinary Rate of Pay. Payments for time spent travelling shall be calculated by estimating the actual travel time and distance by road.

14.8.7 Employees who travel in an Ausgrid vehicle are only entitled to payment for any travel time which exceeds 30 minutes per journey.

14.8.8 Except in the case of unforeseen circumstances arising, the employee shall not be required to work the full two (2) hours if the job to which the employee was called to work Unplanned Overtime, or which the employee was required to perform, is completed within a shorter period.

14.9 Planned Overtime

14.9.1 Planned Overtime is where an employee:

14.9.1.1 is not On Call; and

14.9.1.2 the employee is notified of working overtime while still at work; and

14.9.1.3 works Overtime Hours.

14.9.2 Planned Overtime is paid at the Overtime Rates outlined in clause 14.4.

14.9.3 A minimum of 2 hours will be paid for Planned Overtime.

14.9.4 If an employee is called to a second job within the 2 hours, they will be paid for a minimum of 2 hours only (not an additional 2 hours).

14.9.5 The payment for an employee who works Planned Overtime commences from the time the employee commences working on the job until the employee ceases working on the job.

14.9.6 Except in the case of unforeseen circumstances arising, the employee shall not be required to work the full two (2) hours if the job to which the employee was called to work Planned Overtime, or which the employee was required to perform, is completed within a shorter period.

14.10 Overtime When Working Outside of Hours Without Return

14.10.1 Overtime When Working Outside of Hours Without Return is where an employee:

14.10.1.1 is not On Call;

14.10.1.2 answers a telephone call for business purposes while still at home; and

14.10.1.3 as a result of the call, performs work from home but is not required to leave home.

14.10.2 Overtime When Working Outside of Hours Without Return is paid at the Overtime Rates outlined in clause 14.4.

14.10.3 A minimum of 1 hour will be paid for Overtime When Working Outside of Hours Without Return.

14.10.4 If an employee receives a second call within the 1 hour, they will be paid for a minimum of 1 hours only (not an additional 1 hour).

14.10.5 The payment for an employee who works Overtime When Working Outside of Hours Without Return commences from the time the employee receives the call until the employee ceases working.

14.10.6 Except in the case of unforeseen circumstances arising, the employee shall not be required to work the full one (1) hour if the job to which the employee was called to work Overtime When Working Outside of Hours Without Return, or which the employee was required to perform, is completed within a shorter period.

14.11 Consecutive hours off duty

14.11.1 Where overtime is necessary, whenever possible it shall be organised so that employees shall have at least ten (10) consecutive hours off duty. If so much overtime is worked that an employee cannot take a ten (10) consecutive hour break before the normal commencement time, they shall be entitled to time off without loss of normal pay until they have had a ten (10) consecutive hour break. If a ten (10) hour break is not given then the

employee is paid double time for all hours worked until a ten (10) consecutive hour break is taken.

14.11.2 If a day worker is recalled to work overtime between the time determined by extending the employee's usual ceasing time on the previous day by eight (8) hours and 0400 hours, the employee's normal starting time the next day shall be put back by the number of hours worked between those times or paid at double time for the number of hours worked between those times.

14.11.3 If an employee is required to resume duty after being recalled to work overtime which exceeds four (4) hours, whether continuous or not, before having an ten (10) hour break, the employee shall be paid double time for all hours worked until a break of ten (10) consecutive hours has been taken.

15. ON CALL

15.1 This clause applies except in the case of employees appointed as Professionals, Managers and Specialists in which case clause 43 applies.

15.2 An employee who is On Call shall be paid the On Call Allowance in Appendix 1D, Extra Rates, Item No.'s 4, 5 and 6.

15.3 An employee who is On Call for less than a whole week shall be paid one fifth (1/5th) of the allowance for each working day (Monday – Friday) or part thereof and one quarter (1/4) of the allowance for each Saturday, Sunday or Agreement/Public Holiday or part thereof up to a maximum of the full allowance.

15.4 An employee who is On Call is required to be available for emergency and/or breakdown work at all times outside the employee's usual hours of duty. Upon receiving a call for duty, the employee is to proceed directly to the job.

15.5 Emergency and/or breakdown work includes restoring supply to our customers or making equipment safe which has failed or is likely to fail or maintenance work which is essential to prevent a supply failure. This includes work not only on Ausgrid's equipment but also on our customers' equipment.

15.6 Overtime Rates

15.6.1 The following rates shall apply to employees who are On Call and are required to work:

OVERTIME SITUATION	RATE APPLICABLE
Overtime commenced Monday to Friday	Double time.
Overtime commenced between midnight Friday and midday Saturday	Double time.
Overtime commenced between midday Saturday and midnight Sunday	Double time.
Overtime commenced on a Public Holiday or Agreement Holiday	All hours paid at double time and a half until the employee finishes.
In the case of shift workers, all overtime worked on a day which they are rostered off. (Note: shift workers are not entitled to overtime as a result of changed shifts which they	Double time until released from duty.

organise amongst themselves)	

15.7 An employee who is On Call on an Agreement/Public Holiday and is called in to work on that day shall be entitled to another day off in lieu.

15.8 Payment for a call out shall commence from the time the employee commences working on the job and continues until the employee ceases working on the job.

15.9 An employee who in On Call and receives a call out is paid for the time spent travelling from the employee's home to the job and return at the Ordinary Rate of Pay. Payments for time spent travelling shall be calculated by estimating the actual travel time and distance by road.

15.10 Employees who travel in an Ausgrid vehicle are only entitled to payment for any travel time which exceeds 30 minutes per journey.

15.11 Employees who are on call are not confined to their homes but they must be reasonably available so that they would not be delayed by more than 15 minutes in addition to the time it would normally take to travel from their homes to the place where the work is to be performed. Any delays in excess of 15 minutes will not be paid unless specifically authorised.

15.12 An employee shall not engage in an activity or make a commitment that will adversely affect their obligations when rostered on.

15.13 An employee may be required to attend any other calls which arise prior to returning home.

15.14 Employees who are called out are entitled to a minimum of one (1) hour's pay at the rate set out in clause 15.6.

15.15 If a day worker who is on call is required to work Overtime between the time determined by extending the employee's usual ceasing time on the previous day by eight (8) hours and 0400 hours, the employee's normal starting time the next day shall be put back by the number of hours worked between those times or paid at double time for the number of hours worked between those times.

15.16 If an employee is required to resume duty after a call out which exceeds four (4) hours, whether continuous or not, before having a ten (10) hour break, the employee shall be paid double time for all hours worked until a break of ten (10) consecutive hours has been taken.

15.17 Normal meal break and meal allowance provisions apply to overtime worked on call outs.

16. STANDING BY

16.1 This clause applies to employees who are directed to stand by in readiness to work overtime. It does not apply to employees who are on call.

16.2 Employees who are standing by shall be paid at ordinary rates from the time the employee commences standing by until the time the employee is directed to commence overtime or to cease standing by.

17. MEAL BREAK / MEAL ALLOWANCE

17.1 Meal breaks during ordinary hours shall be of at least a half hour duration. The actual duration and timing of the break shall be set after considering the location and nature of the work and may be altered from time to time in consultation with the employees concerned.

17.2 If an employee is required to work longer than five (5) ordinary hours without a meal or work break, they shall be paid time and a half until a meal break is taken.

17.3 Meal Breaks and Meal Allowances are subject to the following conditions:

17.3.1 For all overtime which commences immediately after an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes and a meal allowance (as set out in Appendix 1D, Extra Rates Item No. 7) after the first hour and a half actually worked. The second meal break and second meal allowance become an entitlement after a total of four (4) hours actually worked. Every subsequent period of four (4) hours actually worked shall entitle the employee to another meal break and meal allowance.

17.3.2 For all overtime which commences immediately before an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes after each period of four (4) hours actually worked. The employee shall be entitled to a meal allowance (as set out in Appendix 1D, Extra Rates Item No. 7) after the first two (2) hours actually worked. Another meal allowance shall become an entitlement after a total of eight (8) hours are actually worked. Every subsequent period of four (4) hours actually worked shall entitle the employee to another meal allowance.

17.3.3 For all overtime which is not continuous with an ordinary day's work, the employee shall be entitled to a paid meal break of 20 minutes and a meal allowance (as set out in Appendix 1D, Extra Rates Item No. 7) after each period of four (4) hours actually worked.

17.4 An employee may, by mutual agreement, extend a meal break on overtime up to a total period of one (1) hour provided that any time in excess of 20 minutes is unpaid.

17.5 Meal breaks which occur during periods of overtime should be taken at the time they fall due unless the employee seeks to defer the break to a later time.

17.6

18. PART-TIME EMPLOYMENT

18.1 A Part-time Employee shall be paid a pro rata rate commensurate with their normal hours worked each week.

18.2 A Part-time Employee shall be entitled to all service entitlements on a pro rata basis commensurate with their normal hours worked each week. Appropriate training will also be provided.

18.3 This Agreement does not provide for guaranteed minimum hours for a Part-time Employee. Guaranteed minimum hours may be agreed between Ausgrid and the Part-time Employee and, if so, must be confirmed in writing.

18.4 A Part-time Employee is only eligible for overtime in accordance with clause 14 when they:

18.4.1 work more than 8 hours in a day; or

18.4.2 work more than 36 hours in a week; or

18.4.3 work outside the period 0600 – 1800 hours Monday to Friday.

19. CASUAL EMPLOYMENT

19.1 Casual Employees shall be paid a loading of 20 per cent which shall be in lieu of all entitlements provided under this Agreement including sick leave and annual leave other than those prescribed below:

19.1.1 Long Service Leave in accordance with the Long Service Leave Act.

19.1.2 Time and half plus the 20 per cent loading for all hours worked in excess of eight (8) hours per day or 72 hours per fortnight or outside the spread of hours or on a Saturday before midday.

19.1.3 Double time plus 20 per cent for all hours worked after midday on a Saturday or on a Sunday or an Agreement/Public Holiday.

19.1.4 Casual Employees shall be eligible for meal allowances and meal breaks as provided in Clause 17 Meal Break/Meal Allowance of this Agreement.

19.2 The objective of this clause is for Ausgrid to take all reasonable steps to provide its employees with secure employment by maximising the number of permanent positions in Ausgrid's workforce, in particular by ensuring that Casual Employees have an opportunity to elect to become full time or Part-time Employees.

19.2.1 A Casual Employee engaged by Ausgrid on a regular and systematic basis for a sequence of periods of employment under this Agreement during a calendar period of six (6) months shall thereafter have the right to apply to have their ongoing contract of employment converted to permanent full time employment or part-time employment if the employment is to continue beyond the conversion process prescribed by this sub-clause.

19.2.2 Ausgrid shall give such an employee notice in writing of the provisions of this sub-clause within four (4) weeks of the employee having attained such period of six (6) months. However, the employee retains their right of application under this sub-clause if Ausgrid fails to comply with this notice requirement.

19.2.3 Any Casual Employee who has a right to apply under Sub-clause 19.2.1, upon receiving notice under Sub-clause 19.2.2 or after the expiry of the time for giving such notice, may give four (4) weeks' notice in writing to Ausgrid that they seek to apply to convert their ongoing contract of employment to full time or part-time employment, and within four (4) weeks of receiving such notice from the employee, Ausgrid shall consent to or refuse the election, but shall not unreasonably so refuse. Where Ausgrid refuses an application to convert, the reasons for doing so shall be fully stated and discussed with the employee concerned, and a genuine attempt shall be made to reach agreement.

19.2.4 Any Casual Employee who does not, within four (4) weeks of receiving written notice from Ausgrid, apply to convert their ongoing contract of employment to full time employment or part-time employment will be deemed to have elected against any such conversion.

19.2.5 Once a Casual Employee has applied to become and has been converted to a full time employee or a Part-time Employee, the employee may only revert to casual employment by written agreement with Ausgrid.

19.2.6 If a Casual Employee has applied to have their contract of employment converted to full time or part-time employment in accordance with Sub-clause 19.2.3, Ausgrid and the employee shall, in accordance with this paragraph, and subject to Sub-clause 19.2.3 discuss and agree upon:

19.2.6.1 whether the employee will convert to full time or Part-time Employee, and

19.2.6.2 if it is agreed that the employee will become a Part-time Employee, the number of hours and the pattern of hours that will be worked will be consistent with any other part-time employment provisions of this Agreement .

19.2.7 Provided that an employee who has worked on a full time basis throughout the period of casual employment has the right to apply to convert their contract of employment to full time employment and an employee who has worked on a part-time basis during the period of casual employment has the right to apply to convert their contract of employment to part-time employment, on the basis of the same number of hours and times of work as previously worked, unless other arrangements are agreed between Ausgrid and the employee.

19.2.8 Following an agreement being reached pursuant to Sub-clause 19.2.6, the employee shall convert to full time or part-time employment.

19.2.9 An employee must not be engaged and re-engaged, dismissed or replaced in order to avoid any obligation under this Sub-clause.

19.2.10 Disputes regarding the application of this Sub-clause

19.2.10.1 Where a dispute arises as to the application or implementation of Sub-clause 19.2, the matter shall be dealt with pursuant to the Dispute Settlement Procedure contained in Clause 4.

20. LABOUR HIRE/AGENCY HIRE WORKERS

20.1 Persons covered by this agreement recognise the need for Ausgrid to engage labour hire workers from time to time to meet business needs. Ausgrid will consult with the relevant persons in relation to the prospective need for labour hire engagement in accordance with clause 5.

21. FIXED TERM EMPLOYMENT

21.1 Fixed term employees shall be paid and be entitled to all the conditions under this Agreement which are appropriate.

21.2 A fixed term employee does not include a casual employee.

21.3 Fixed term appointments may be made for a period of up to 12 months. At the expiration of that period work requirements will be reviewed by the parties.Consultation with affected employees and their representatives will occur if Ausgrid proposes to extend fixed term appointments beyond the 12 month period.

21.4 Fixed term employment shall not be used as an alternative to full time employment.

21.5 Ausgrid will consult through the PCC before introducing fixed term employees in areas which have not traditionally engaged employees in this manner.

21.6 Where a fixed term employee is required to replace another employee who has taken absence on parental leave (or the vacant position arises as a consequence of another employee filling a parental leave absence), clause 21.5 will not be required. Should an ongoing requirement for a

fixed term employee be identified following the completion of that parental leave absence, then clause 21.5 will apply.

22. JOB-SHARING

22.1 Job-sharing is a particular type of work where one or more full time positions are shared by two or more employees to cover an agreed span of hours.

22.2 Where a full time employee requests to convert to part-time work and their current position needs someone on duty full time, a job-sharing arrangement may be suitable.

22.3 A job-sharer shall be paid a pro rata rate commensurate with their normal hours worked each week.

22.4 A job-sharer shall be entitled to all service entitlements on a pro rata basis commensurate with their normal hours worked each week. Appropriate training will also be provided.

22.5 In the event that one of the employees sharing a job either resigns or is appointed to another position, the remaining employee will be offered the opportunity to be appointed to the position on a full time basis.

22.6 A breakdown in an existing job-share arrangement will not be used as an opportunity to change the full time status of that position without full consultation with the appropriate union(s) partner(s).

23. INDIVIDUAL FLEXIBILITY TERM

23.1 Ausgrid and an employee covered by this Agreement may agree to make an individual flexibility arrangement to vary the effect of terms of the Agreement if:

23.1.1 the individual flexibility agreement deals with one or more of the following matters:

23.1.1.1 hours of work;

23.1.1.2 overtime;

23.1.1.3 penalty rates;

23.1.1.4 allowances;

23.1.1.5 taking or cashing out accumulated RDOs;

23.1.1.6 salary sacrifice;

23.1.1.7 superannuation; and

23.1.1.8 for employees appointed as a Professional, Manager & Specialist under clause 43, salary packaging in accordance with clause 43.3.

23.2 The arrangement meets the genuine needs of Ausgrid and the employee in relation to one or more of the matters mentioned clause 22.1.1 and the arrangement is genuinely agreed to by Ausgrid and the employee.

23.3 Ausgrid must ensure that the terms of the individual flexibility arrangement:

23.3.1 are about permitted matters under section 172 of the *Fair Work Act 2009*; and

23.3.2 are not unlawful terms under section 194 of the *Fair Work Act 2009*; and

23.3.3 result in the employee being better off overall than the employee would be if no arrangement was made.

23.4 Ausgrid must ensure that the individual flexibility arrangement:

23.4.1 is in writing; and

23.4.2 includes the name of the employer and employee; and

23.4.3 is signed by Ausgrid and the employee and if the employee is under 18 years of age, signed by a parent or guardian of the employee; and

23.4.4 includes details of:

23.4.4.1 the terms of the enterprise agreement that will be varied by the arrangement; and

23.4.4.2 how the arrangement will vary the effect of the terms; and

23.4.4.3 how the employee will be better off overall in relation to the terms and conditions of his or her employment as a result of the arrangement; and

23.4.5 states the day on which the arrangement commences.

23.5 Ausgrid must give the employee a copy of the individual flexibility arrangement within 14 days after it is agreed to.

23.6 Ausgrid or the employee may terminate the individual flexibility arrangement:

23.6.1 by giving no more than 13 weeks written notice to the other party to the arrangement; or

23.6.2 if Ausgrid and the employee agree in writing - at any time.

24. ANNUAL LEAVE

24.1 Employees, excluding shift workers, shall accumulate 144 hours of annual leave in each complete year of service.

24.2 This leave will be approved by Ausgrid provided that adequate employees are available to meet the needs of the organisation.

24.3 Annual leave may be taken in any combination of separate periods. These should be taken in whole days.

24.4 Payment for annual leave shall be at the Ordinary Rate of Pay. See Clause 40 Higher Grade Pay in relation to Higher Grade Pay.

24.5 Employees may be allowed to take a period of annual leave in advance of its accrual, subject to approval. Where their employment subsequently terminates before the leave has accrued on a pro rata basis, Ausgrid may deduct any pre-payment from their termination pay.

24.6 Any Agreement/Public Holidays which occur during annual leave shall not be deducted from annual leave entitlements.

24.7 Rostered days off do not accrue during periods of annual leave.

24.8 Seven Day Shift workers shall accumulate 200 hours of annual leave in each complete year of service. Other shift workers shall accumulate 160 hours of annual leave in each complete year of service.

24.9 Employees who have worked as Seven Day Shift workers for part of a year shall receive a pro rata entitlement to additional annual leave.

24.10 When an employee ceases employment for any reason, they shall be paid for any annual leave which has not yet been taken for each completed year of service. The employee shall also be paid a pro rata amount for any leave which has not been taken for any partly completed year of service. Payment for all outstanding annual leave shall be at the ordinary rate which applied at the time employment ceased. (See Clause 40 in relation to Higher Grade Pay).

24.11 Employees shall not commence annual leave whilst on sick leave or accident leave.

24.12 All annual leave is paid at the employee's Ordinary Rate of Pay and Higher Grade Pay where applicable (See Clause 40 Higher Grade Pay). Shift workers are paid for their annual leave at their ordinary rate inclusive of shift allowances or receive an annualised holiday loading paid at 1.65% each week, whichever is the greater.

24.13 Employees may use single days of annual leave to look after sick relatives or deal with emergencies. In these circumstances, the employee should provide his/her manager with as much notice as possible before the scheduled start of work.

24.14 Direction to take annual leave

24.14.1 Ausgrid may direct an employee to take paid annual leave if the employee has accrued more than six weeks paid annual leave or, in the case of a shift worker if the shift worker has accrued more than eight weeks paid annual leave.

24.14.2 Ausgrid must give an employee at least one month's notice of the requirement to take annual leave prior to the date the employee is required to commence the annual leave.

25. SICK LEAVE

25.1 Employees are entitled to access paid sick leave when their personal illness or personal injury prevents them from attending their workplace.

25.2 Visits to a doctor or dentist during the employee's normal working hours and any other part day absences due to an employees' personal illness or personal injury will be debited against the employee's sick leave entitlements.

25.3 An employee shall not be entitled to paid leave under this clause for any period in respect of which the employee is entitled to workers' compensation.

25.4 An employee is entitled to 120 hours of sick leave for each year of service.

25.5 An employee's entitlement to paid sick leave accrues progressively during a year of service according to the employee's ordinary hours of work and accumulates from year to year.

25.6 Retiring Ill Health

25.6.1 An employee who is diagnosed as being so sick that they are not expected to ever be fit for normal duties shall be "Retired-Ill Health".

25.6.2 The date of retirement will normally be the date that their sick leave entitlements are exhausted. However, the employee will have the option to take a lump sum payment for sick leave in accordance with Clause 37 Cashing in Sick Leave and retire after any sick leave which accrued after 15 February 1993 has been exhausted.

25.6.3 No additional sick leave entitlements will accrue from the date the diagnosis is made.

25.7 If an employee provides medical evidence that they were injured or sick whilst on annual leave or long service leave to such an extent that they were unable to derive benefit from the leave, then the period of leave which is affected will be re-credited provided it is at least of five (5) consecutive working days duration.

25.8 Agreement/Public Holidays and RDOs which occur during periods of sick leave are not counted as sick leave.

25.9 Subject to Sub-clause 24.12 below, a certificate from a medical practitioner is required for all claims for sick pay which exceed two (2) working days.

25.10 However, where the relevant manager considers an employee's sick leave record to be unsatisfactory, the employee may be required to produce a medical certificate to cover all absences for the next 12 months.

25.11 Claims for sick leave and/or pay not covered by a medical certificate shall not be made more frequently in any year of service than:

- in the case of employees with less than one (1) years service, a medical certificate is required for all occasions where a claim for paid sick leave is made;
- in the case of employees with one (1) year but less than five (5) years service – four (4) occasions in any twelve (12) month period.
- In the case of employees with five (5) years or more service – five (5) occasions in any twelve (12) month period.

25.12 Paid sick leave will not be available for absences on either the last working day before, or the first working day after:

25.12.1 an Agreement/Public Holiday provided for in Clause 33, annual leave or long service leave;

25.12.2 an RDO,

unless a medical certificate is provided.

25.13 A medical certificate should include the following information:

- Name of employee
- Name of doctor and signature
- Reason for absence *
- Period during which the employee is unfit for work, and
- Date of issue.

*While it is reasonable for Ausgrid to ask the reason for an absence, the employee and treating doctor can decide how much detail is provided.

25.14 Where an employee is required to obtain a medical certificate it should be obtained during the period of absence on sick leave and not be obtained retrospectively. This requirement may be waived in extenuating circumstances.

25.15 Part day absences shall be debited against the employee's sick leave entitlement.

25.16 Employees will make reasonable efforts to notify their supervisor as close to the normal start time as practical if they are going to be absent on sick leave.

25.17 If there is any dispute about a doctor's diagnosis in relation to sick leave, a second opinion may be obtained from another doctor jointly selected by the persons covered by this Agreement. This

second opinion will be deemed to settle the dispute. Any cost for obtaining the second opinion will be paid by the person that the decision goes against.

25.18 Independent Medical Examination

25.18.1 Ausgrid may direct an employee to attend an independent medical examination with a doctor nominated by Ausgrid if:

25.18.1.1 the employee has taken more than 10 days' sick leave in any 12 month period; or

25.18.1.2 Ausgrid has identified that the employee has a pattern of sick leave; or

25.18.1.3 Ausgrid is concerned with respect to a duty of care to the employee.

25.18.2 The employee must attend any appointment(s) made by Ausgrid under this clause and must comply with any reasonable and lawful directions made by the Independent Medical Examination provider.

26. LONG SERVICE LEAVE

26.1 In addition to the below provisions, Long Service Leave is governed by the provisions of the *Long Service Leave Act NSW* (1955).

26.2 Long Service Leave shall accrue according to the following scale:

After 10 years service	13 weeks
Per completed year of service after 10 years service	1.3 weeks

26.3 All long service leave is paid at the employee's Ordinary Rate of Pay as defined.

26.4 An employee who has completed five years' service and less than ten years' service with Ausgrid and whose employment terminates for any reason other than misconduct, shall be entitled to payment of 1.3 week's pay for each year of service and pro rata for partly completed years to the nearest day.

26.5 An employee who has completed ten or more years' service with Ausgrid whose employment terminates for any reason other than misconduct, shall be entitled to the following pro rata long service leave, minus any periods of long service leave already taken:

Ten years service	13 weeks
Per completed year of service	1.3 weeks

Pro rata amounts will be paid for partly completed years to the nearest day.

26.6 Employees who have continuity of service with an organisation which merged with Ausgrid or whose service with a previous employing organisation is recognised by Ausgrid for long service leave purposes, will have that service and any periods of long service leave taken into consideration in calculating their entitlement in terms of Clause 36, Calculation of Service.

26.7 Employees shall not commence long service leave whilst on sick or accident leave.

26.8 Employees shall give at least four weeks' notice of their intention to take long service leave. Shorter notice may be agreed, subject to work requirements.

26.9 Employees should take long service leave as soon as possible after the entitlement has accrued, subject to the business needs of Ausgrid.

26.10 All long service leave will be taken in amounts no less than one day.

27. SPECIAL LEAVE

27.1 Special Leave may be granted for the following purposes:

27.1.1 Blood donations;

27.1.2 Attending to union matters, including training and official conferences;

27.1.3 Attending Employee Assistance Program; or

27.1.4 Personal circumstances.

27.2 Special Leave may be taken as Community Service Leave in which case the following will apply:

27.2.1 An employee who engages in an eligible community service activity is entitled to be absent from his or her employment if:

27.2.1.1 the period consists of one or more of the following:

(A) time when the employee engages in the activity;

(B) reasonable travelling time associated with the activity;

(C) reasonable rest time immediately following the activity; and

27.2.1.2 unless the activity is jury service – the employee's absence is reasonable in all the circumstances.

27.2.2 An eligible community service activity is:

27.2.2.1 Jury Service; or

27.2.2.2 a voluntary emergency management activity (as defined by the *Fair Work Act 2009*).

27.2.3 An employee who is required to attend for Jury Service will be granted leave which will count as service. An employee will be paid the difference between their Ordinary Rate of Pay and the amount paid for Jury Service.

27.2.4 An employee must provide Ausgrid with all reasonable evidence to support the taking of Community Service Leave as requested by Ausgrid.

27.3 Special Leave may be granted with or without pay by agreement.

27.4 Special Leave may or may not count for service by agreement.

27.5 Special Leave with pay will be granted to employees for their first appointment under the Employee Assistance Program. Subsequent appointments are subject to Sub-clauses 27.2 and 27.3 above.

27.6 Employees are encouraged to use RDOs or single days of annual leave to cover other absences. The employee should provide his/her manager with as much notice as possible before the scheduled start of work.

27.7 An employee who is required to attend military training will have such periods counted as part of service, up to a maximum of 14 days per year. The employee will be paid the difference between their Ordinary Rate of Pay and the amount paid for military training, on production of evidence of the employee's attendance and money paid to the employee.

28. COMPASSIONATE LEAVE

28.1 An employee, is entitled to 2 days of compassionate leave for each occasion (a permissible occasion) when a member of the employee's immediate family (as defined in clause 30.3), or a member of the employee's household:

28.1.1 contracts or develops a personal illness that poses a serious threat to his or her life; or

28.1.2 sustains a personal injury that poses a serious threat to his or her life; or

28.1.3 dies.

28.2 Compassionate leave for permanent employees is without loss of pay for ordinary hours occurring during the period of the compassionate leave.

28.3 Compassionate leave for Casual Employees is unpaid.

28.4 An employee may take compassionate leave for a particular permissible occasion if the leave is taken:

28.4.1 to spend time with the member of the employee's immediate family or household who has contracted or developed the personal illness, or sustained the personal injury, referred to in clause 30.3; or

28.4.2 after the death of the member of the employee's immediate family or household referred to in clause 30.3.

28.5 An employee may take compassionate leave for a particular permissible occasion as:

28.5.1 a single continuous 2 day period; or

28.5.2 2 separate periods of 1 day each; or

28.5.3 any separate periods to which the employee and Ausgrid agree.

28.5.4 If the permissible occasion is the contraction or development of a personal illness, or the sustaining of a personal injury, the employee may take the compassionate leave for that occasion at any time while the illness or injury persists.

28.6 Ausgrid must not fail to re-engage a Casual Employee because the employee accessed the entitlement provided for in this clause. The rights of Ausgrid to engage or not engage a Casual Employee are not otherwise affected.

29. CARER'S LEAVE

29.1 An employee, other than a Casual Employee, with responsibilities in relation to a class of person set out in sub-paragraph 30.3, who needs the employee's care and support, shall be entitled to use, in accordance with this sub-clause, any current or accrued sick leave entitlement, provided for in Clause 24 Sick Leave, for absences to provide care and support, for such persons when they are ill or who require care due to an unexpected emergency. Such leave may be taken for part of one day. In the unlikely event that more than ten (10) days sick leave in any year is to be used for

caring purposes the employer and employee shall discuss appropriate arrangements which, as far as practicable, take account of the employer's and employee's requirements. Where the persons covered by this Agreement are unable to reach agreement the disputes procedure at Clause 4 should be followed

29.2 The employee shall, if required,

29.2.1 establish either by production of a medical certificate or statutory declaration, the illness of the person concerned and that the illness is such as to require care by another person, or

29.2.2 establish by production of documentation acceptable to the employer or a statutory declaration, the nature of the emergency and that such emergency resulted in the person concerned requiring care by the employee.

In normal circumstances, an employee must not take carer's leave under this sub-clause where another person had taken leave to care for the same person.

29.3 The entitlement to use sick leave in accordance with this clause is subject to:

29.3.1 the leave being taken to provide care or support to a member of the employee's immediate family, or a member of the employee's household, who requires care and support because of:

29.3.1.1 a personal illness, or personal injury affecting the member, or

29.3.1.2 an unexpected emergency affecting the member.

29.4 An employee shall, wherever practicable, give the employer reasonable notice prior to the intention to take leave; the reasons for taking such leave and the estimated length of absence. If it is not practicable for the employee to give prior notice of absence, the employee shall notify the employer by telephone of such absence at the first opportunity on the day of absence.

29.5 Where an employee has exhausted their paid sick leave entitlements, an employee is entitled to take 2 days of unpaid carer's leave for the purpose of providing care and support to a class of person set out in Sub-clause 30.3 above who is ill or who requires care due to an unexpected emergency.

29.6 An employee may elect with the consent of the employer, to take annual leave not exceeding ten (10) days in single-day periods, or part thereof, in any calendar year at a time or times agreed by the employer and employee, for the purposes of providing care to a class of person set out in Sub-clause 30.3.

29.6.1 An employee may elect with the employer's agreement to take annual leave at any time within a period of 24 months from the date at which it falls due.

29.7 An employee may elect, with the consent of the employer, to take time off in lieu of payment for overtime at a time or times agreed with the employer within twelve (12) months of the said election.

29.8 Overtime taken as time off during ordinary time hours shall be taken at the ordinary time rate, which is an hour for each hour worked.

29.9 If, having elected to take time as leave, in accordance with Sub-clause 30.6, the leave is not taken for whatever reason, payment for time accrued at overtime rates shall be made at the expiry of the twelve (12) month period or on termination.

29.10 Where no election is made in accordance with the said Sub-clause 30.6, the employee shall be paid overtime rates in accordance with the Agreement.

29.11 An employee may elect, with the consent of Ausgrid, to work 'make-up-time' under which the employee takes time off ordinary hours and works those hours at a later time, during the Span of Hours provided in the Agreement, at the Ordinary Rate of Pay.

29.12 An employee on shift work may elect, with the consent of the employer, work 'make-up-time' (under which the employee takes time off ordinary hours and works those hours at a later time) at the shift work rate which would have been applicable to the hours taken off.

29.13 An employee may elect, with the consent of the employer, to take a RDO at any time.

29.14 An employee may elect, with the consent of the employer, to take RDOs in part day amounts.

29.15 An employee may elect, with the consent of the employer, to accrue some or all RDOs for the purpose of creating a bank to be drawn upon at a time mutually agreed between the employer and employee, or subject to reasonable notice by the employee or the employer.

29.16 This sub-clause is subject to the employer informing each union which is both party to the Agreement and which has members employed at the particular enterprise of its intention to introduce an enterprise system of RDO flexibility, and providing a reasonable opportunity for the union(s) to participate in negotiations.

29.17 Personal Carer's Entitlement for Casual Employees

29.17.1 Subject to the evidentiary and notice requirements in Sub-clauses 30.2 and 30.4, Casual Employees are entitled to not be available to attend work, or to leave work if they need to care for a person prescribed in Sub-clause 30.3 of this clause who are sick and require care and support, or who require care due to an unexpected emergency, or the birth of a child.

29.17.2 The employer and the employee shall agree on the period for which the employee will be entitled to not be available to attend work. In the absence of agreement, the employee is entitled to not be available to attend work for up to 48 hours (i.e. two (2) days) per occasion. The Casual Employee is not entitled to any payment for the period of non-attendance.

29.17.3 An employer must not fail to re-engage a Casual Employee because the employee accessed the entitlements provided for in this clause. The rights of an employer to engage or not to engage a Casual Employee are otherwise not affected.

30. PARENTAL LEAVE

30.1 The following provisions shall also apply in addition to those set out in Chapter 2, Part 2-2, Division 5 – 'Parental leave and related entitlements' of the NESunder the *Fair Work Act 2009* (Cth); and the *Paid Parental Leave Act 2010* (Cth). The provisions within this clause shall also operate in conjunction with the relevant policies and procedures adopted by Ausgrid from time to time.

30.2 Ausgrid Paid Parental Leave

30.2.1 Employees who are eligible for Parental Leave without pay shall be entitled to receive up to 14 weeks of paid leave (or 28 weeks at half pay) included in the 12 months approved at their ordinary rate of remuneration to assist the employee's ability to reconcile work and family responsibilities and to return to work within the maximum timeframe, if consented, as determined at Sub-clause 31.4.

30.3 Casual Employees

30.3.1 Ausgrid must not fail to re-engage a regular Casual Employee because the:

30.3.1.1 employee or employee's spouse is pregnant

30.3.1.2 employee is or has been immediately absent on parental leave

30.3.1.3 rights of an employer in relation to engagement and re-engagement of Casual Employees are not affected, other than in accordance with this clause.

30.4 Right to request

30.4.1 An employee entitled to parental leave may request Ausgrid to allow the employee to:

30.4.1.1 extend the period of simultaneous unpaid parental leave use up to a maximum of eight (8) weeks

30.4.1.2 extend the period of unpaid parental leave for a further continuous period of leave not exceeding 12 months

30.4.1.3 return from a period of parental leave on a part-time basis until the child reaches school age

30.4.1.4 receive assistance in reconciling work and parental responsibilities.

30.4.2 Ausgrid shall consider the request having regard to the employee's circumstances and, provided the request is genuinely based on the employee's parental responsibilities, may only refuse the request on reasonable grounds related to the effect on the workplace or Ausgrid's business. Such grounds might include cost, lack of adequate replacement staff, loss of efficiency and the impact on customer service.

30.5 Employee's request and Ausgrid's decision to be in writing

The employee's request and Ausgrid's decision made under Sub-clauses 31.4.2 must be recorded in writing.

30.5.1 Request to return to work part-time

Where an employee wishes to make a request under Sub-clause 31.4.1.3 such a request must be made as soon as possible but no less than seven (7) weeks prior to the date upon which the employee is due to return to work from parental leave.

30.6 Other Parent Leave

30.6.1 Employees covered by this Agreement who wish to access concurrent Parental Leave, shall be entitled to one weeks paid parental leave on successful application, in accordance with Ausgrid's Parental Leave Policy.

30.7 Communication during all forms of parental leave

30.7.1 Where an employee is on parental leave and a definite decision has been made to introduce significant change at the workplace, Ausgrid shall take reasonable steps to:

30.7.1.1 make information available in relation to any significant effect the change will have on the status or responsibility level of the position the employee held before commencing parental leave, and

30.7.1.2 provide an opportunity for the employee to discuss any significant effect the change will have on the status or responsibility level of the position the employee held before commencing parental leave.

30.7.2 The employee shall take reasonable steps to inform Ausgrid about any significant matter that will affect the employee's decision regarding the duration of parental leave to be taken,

whether the employee intends to return to work and whether the employee intends to request to return to work on a part-time basis.

30.7.3 The employee shall also notify Ausgrid of changes of address or other contact details which might affect Ausgrid's capacity to comply with Sub-paragraph 31.7.1.

30.8 Adoption Leave

Any employee may take unpaid leave in connection with the adoption of a child under five years of age for a maximum of 52 weeks. Additional adoption leave provisions are as per the Ausgrid Parental Leave Policy as at 19 December 2010.

31. CAREER BREAK

31.1 Employees are eligible to apply for a career break to meet personal, family or community responsibilities, e.g. study, child rearing, looking after a sick relative, personal development, etc.

31.2 A career break provides between three (3) months and one (1) year of unpaid leave and may be combined with other leave to provide a total period of absence up to two (2) years.

31.3 Employees who take a career break maintain continuity of employment but the period of leave does not count for service.

31.4 Employees who take a career break will be able to return to either their old position or an equivalent position.

32. DOMESTIC VIOLENCE

32.1 General Principle

32.1.1 Ausgrid recognises that employees sometimes face situations of violence or abuse in their personal life that may affect their attendance or performance at work. Therefore, Ausgrid is committed to providing support to staff that experience domestic violence.

32.2 Definition of Domestic Violence

32.2.1 Domestic violence includes physical, sexual, financial, verbal or emotional abuse by an immediate family member as defined in this Agreement.

32.3 General Measures

32.3.1 Proof of domestic violence may be required and can be in the form an agreed document issued by the Police Service, a Court, a Doctor, a Domestic Violence Support Service or Lawyer.

32.3.2 All personal information concerning domestic violence will be kept confidential in line with Ausgrid Policy and relevant legislation. No information will be kept on an employee's personnel file without their express written permission.

32.3.3 No adverse action will be taken against an employee if their attendance or performance at work suffers as a result of experiencing domestic violence.

32.3.4 Ausgrid will identify a contact in Human Resources who will be trained in domestic violence and privacy issues. Ausgrid will advertise the name of the contact within the organisation.

32.3.5 An employee experiencing domestic violence may raise the issue with their immediate supervisor or the Human Resources contact. The supervisor may seek advice from Human Resources if the employee chooses not to see the Human Resources contact.

32.3.6 Where requested by an employee, the Human Resources contact will liaise with the employee's supervisor on the employee's behalf, and will make a recommendation on the most appropriate form of support to provide in accordance with sub clauses 32.4 and 32.5.

32.3.7 Ausgrid will develop guidelines to supplement this clause and which details the appropriate action to be taken in the event that an employee reports domestic violence.

32.4 Leave

32.4.1 An employee experiencing domestic violence will have access to 20 days per year of paid special leave for medical appointment, legal proceedings and other matters and activities arising from domestic violence.

32.4.2 This leave will be in addition to existing leave entitlements and may be taken as consecutive or single days or as a fraction of a day and can be taken without prior approval.

32.4.3 An employee who supports a person experiencing domestic violence may take carer's leave to accompany them to court, to hospital, or to mind children.

32.5 Individual Support

32.5.1 In order to provide support to an employee experiencing domestic violence and to provide a safe work environment to all employees, Ausgrid will approve any reasonable request from an employee experiencing domestic violence for:

32.5.1.1 Changes to their span of hours or pattern or hours and/or shift patterns;

32.5.1.2 Job redesign or changes to duties;

32.5.1.3 Relocation to suitable employment within the Ausgrid;

32.5.1.4 A change to their telephone number or email address to avoid harassing contact;

32.5.1.5 Any other appropriate measure including those available under existing provisions for family friendly and flexible work arrangements.

32.5.2 An employee experiencing domestic violence will referred to the Employee Assistance Program (EAP) and/or other local resources. The EAP shall include professionals trained specifically in domestic violence.

33. AGREEMENT/PUBLIC HOLIDAYS

33.1 The days on which the following holidays are gazetted shall be days off work without loss of pay:

New Year’s Day
Australia Day
Ausgrid Employee Day*
Good Friday
Easter Saturday
Easter Sunday
Easter Monday

Anzac Day
Queen's Birthday
Labour Day
Christmas Day
Boxing Day

33.2 Ausgrid Employee Day is an employee day for all employees who are covered under this Agreement and is in substitution for the first day, or part day, declared or prescribed by or under a law of a State or Territory to be observed within a region of the State.

*For ex-Sydney Electricity employees this will be the second Friday in March. For ex-Orion Energy employees this will be a day determined between the persons covered by this Agreement.

33.3 In addition, employees shall be entitled to the day off work without loss of pay for any other days which are gazetted as Public Holidays throughout NSW.

33.4 Any Agreement/Public Holiday which falls during a period of annual leave, sick leave or long service leave shall not be debited against that leave.

33.5 If an Agreement/Public Holiday occurs on an employee's scheduled day off or RDO then the employee shall receive an additional day's pay at the ordinary rate or shall be entitled to another day off in lieu.

33.6 An employee who is absent from duty without approval on the working day prior to, or the working day after, an Agreement/Public Holiday shall not be entitled to pay for that holiday or the unauthorised absence.

33.7 Where an employee has been on unauthorised leave for more than five (5) consecutive working days, which may include an RDO, the employee is not eligible to be paid for any Agreement/Public Holidays which occur during the leave.

33.8 An employee who is on call on an Agreement/Public Holiday and is called in to work on that day shall be entitled to another day off in lieu.

34. ROSTERED DAYS OFF (RDO)

34.1 This clause applies except in the case of employees appointed as Professionals, Managers and Specialists in which case clause 43 applies.

34.2 A rostered day off (RDO) occurs in the system of working a nine (9) day fortnight and is defined as a weekday Monday to Friday on which an employee is not required to work because the employee has worked additional time which has accrued towards a day off.

34.3 The normal working arrangement for employees is nine (9) eight (8) hour days per fortnight and RDOs are normally taken on a Monday or Friday.

34.3.1 Those employees working in the Contact Centre as Customer Service Representatives or Team Leaders with access to RDOs shall have their RDOs rostered on a rolling basis across Monday to Friday with a three (3) month timetable, based on business requirements.

34.4 Accumulation of RDOs

34.4.1 Employees can accumulate up to five (5) RDOs which can be taken at any time subject to mutual agreement after having regard to the needs of the work area and the needs of the employees.

34.4.2 This may be varied by using an individual flexibility arrangement in accordance with clause 22.

34.5 When an employee takes more than two (2) consecutive RDOs and another employee acts in his/her job, then that employee shall be eligible for higher grade pay.

34.6 If employees need time off for an emergency or unforseen event, they are encouraged to use accumulated RDOs or to take a RDO in advance. In all circumstances, the employee should provide his/her manager with as much notice as possible before commencing the absence.

34.7 RDOs may only be taken once they have been accrued. The number of RDOs which an employee may take in a year when four (4) weeks annual leave is taken, is limited to 24.

During the life of this agreement the persons covered by it will implement consistency between current practices and this clause and appendix two of the agreement.

35. TERMS OF EMPLOYMENT

35.1 Notice

35.1.1 Ausgrid shall give an employee the following periods of notice or payment in lieu:

Employee's period of continuous service with Ausgrid (See Clause 36 Calculation of Service)	**Period of Notice**
Not more than 1 year	1 week
More than 1 year but not more than 3 years	2 weeks
More than 3 years but not more than 5 years	3 weeks
More than 5 years	4 weeks

35.1.2 This period of notice given by Ausgrid is increased by one (1) week if the employee is over 45 years of age and has completed at least two (2) years of continuous service with Ausgrid.

35.1.3 This shall not limit Ausgrid's right to dismiss an employee without notice for serious misconduct.

35.1.4 Employees shall provide Ausgrid with not less than one week's notice of termination or forfeit one week's wages in lieu.

35.2 If an employee is absent without notifying Ausgrid for a continuous period of five (5) working days (including RDOs) without reasonable cause, they will be considered to have abandoned their employment and may be dismissed effective from the last day actually worked.

35.3 The decision to dismiss an employee shall rest with the Chief Executive Officer.

35.4 An employee may retire from Ausgrid after reaching 55 years of age.

35.5 An employee may be required to work reasonable overtime, unless the employee has reasonable grounds for refusing.

35.6 Except as otherwise provided in this Agreement, money cannot be deducted from an employee's pay without written authority from the employee except where an employee leaves Ausgrid and annual leave has been taken in advance but has not yet accrued on a pro rata basis.

35.7 Employees are not entitled to pay in the following circumstances:

35.7.1 where an employee is absent without authorisation, or

35.7.2 where an employee is absent due to sickness but has no entitlement to paid sick leave.

35.8 Suspension without pay for an appropriate time may be applied as an alternative to dismissal. This should be discussed with the employee and the relevant union before a final decision is made.

35.9 Where a role covered by this agreement has become redundant then the employee in that role will be managed in accordance with the Ausgrid Redundancy and Redeployment Policy.

35.10 The redundancy policy for the term of this agreement is the Ausgrid Redundancy and Redeployment Policy dated [insert date] 2014

36. CALCULATION OF SERVICE

36.1 All service as an apprentice, trainee or cadet shall count towards service entitlements under this Agreement.

36.2 The following periods will not count for service and will not break the continuity of service with Ausgrid;

36.2.1 Sick leave without pay

36.2.2 Parental leave without pay

36.2.3 Leave without pay, whether authorised or not*

*Leave without pay can be assessed on a case by case basis by Ausgrid to determine whether or not it will count for service.

36.3 Where Ausgrid has terminated an employee's employment because of ill health or injury, and the employee is subsequently retired, the total length of service shall be taken into account in calculating the employee's entitlements.

36.4 Employees who commenced duties with Ausgrid as a result of the amalgamations and mergers of Shires, Municipalities and County Councils on or prior to 1 January 1980 and mergers in 1995 shall have their previous service recognised in calculating their service entitlements.

36.5 From date of corporatisation of EnergyAustralia, 1 March 1996, the following service counts for long service (extended) leave purposes for staff employed by Ausgrid as at 1 March 1996:

36.5.1 Prior service with approved Government Departments will be recognised; this provision only applies for employees who were employed before 1 March 1996.

36.5.2 Prior service with approved NSW Authorities will be recognised.

36.5.3 Prior service with former Local Government regulated distributors which were engaged in electricity distribution will be recognised.

36.5.4 Prior service with approved State-Owned Corporations will be recognised.

Prior service with the Australian Public Service will no longer be recognised after 1 March, 1996.

36.6 New employees recruited from the New South Wales Public Service after 1 March 1996, will continue to have the option of transferring their existing extended leave, recreation leave and sick leave balances to Ausgrid, subject to the existing arrangements for transfer of funds from the previous employer.

36.7 For the purposes of 36.5 and 36.6above, the period of service for recognition must be 'continuous', which is defined as follows;

36.7.1 the employee entered on duty in Ausgrid on the next working day following cessation of employment with the recognised former employer; or

36.7.2 the employee has been accepted for employment by Ausgrid prior to the last day of service with the recognised former employer, in which case a break of up to two (2) months may be allowed between cessation of duty with the former recognised employer and commencement of employment with Ausgrid.

36.8 Ausgrid shall determine whether any transferred officer's application is relevant in accordance with the relevant legislation and policy and administer those applications which accord with the appropriate criteria. A list of employers recognised for prior service is attached to this agreement at schedule 5 but does not form part of the agreement.

37. CASHING IN SICK LEAVE

37.1 Where an employee requests during the course of his or her employment, or on termination of employment for any reason other than serious misconduct; the employee shall be paid his or her accumulated untaken sick leave at the Ordinary Rate of Pay applicable to the employee at that time or 1 July 2009 whichever date is earlier.

37.2 The maximum number of hours of sick leave that may be cashed in is to be calculated as follows:

Step 1: Calculate the number of hours of accumulated sick leave as at the date of request to be paid, or termination of employment.

Step 2: Calculate the number of hours of accumulated sick leave as at 15 February 1993 that the employee could have cashed-in if his or her employment had been terminated immediately before 15 February 1993.

The maximum number of hours of accumulated sick leave that may be cashed-in is the lesser of the two numbers calculated under Step 1 and Step 2.

37.3 The intention of subclauses 37.1 and 37.2 above is to ensure that when an employee is obliged to use sick leave credits accumulated prior to 15 February 1993 then such sick leave will be re-credited to the pre 15 February 1993 balance when the employee is again entitled to annual sick leave credits available in the following year of service.

38. EXCESS TRAVEL

38.1 Each employee is responsible for getting themselves to and from work each day.

38.2 Excess travel time is defined as additional travelling time incurred by an employee in the following circumstances where:

38.2.1 the employee is directed to start work at a location which takes longer to travel to or from their home than to the usual place of work.

38.2.2 the employee is transferred to a new place of work which takes longer to travel to or from their home than to the former place of work. See also Sub-clause 38.4.

38.3 Where the employee does not have a usual place of work but instead has a nominal headquarters to which they are attached, for the purpose of calculating excess travel the headquarters are treated as the usual place of work.

38.4 Where an employee is transferred to a new place of work, payment for any excess travel shall only continue for the first six (6) months. This does not include transfers or appointments made at the employee's request or which are made for disciplinary reasons.

38.5 Payments for excess travel shall be calculated by estimating the actual travel time and distance by road. Excess travel time shall be calculated at ordinary rates for journeys undertaken Monday to Saturday inclusive and at ordinary time plus a half on Sundays and Agreement/Public Holidays.

38.6 Reimbursement for the distance travelled is not paid in any circumstances where an employee travels in an Ausgrid vehicle.

38.7 Excess travel is not paid for journeys undertaken during work time.

38.8 An employee will be paid for his/her actual excess travel time and fares or the amount calculated under 38.5 above, whichever is the greater. Where an employee believes he/she has not at least been paid for the actual excess travel time and fares, he/she should submit a claim providing sufficient details about the actual mode of transport and the duration of travel for the claim to be assessed and paid.

38.9 Employees who travel in an Ausgrid vehicle are only entitled to payment for any excess travel time which exceeds 30 minutes per journey.

38.10 Notwithstanding Sub-clause 38.9 above, employees who travel to and from work in an Ausgrid vehicle shall not be entitled to payment for excess travel if the payment means it is no longer worthwhile to Ausgrid for the employee to take a vehicle to and from work. Payment for excess travel to employees who use an Ausgrid vehicle must be authorised by the relevant General Manager.

39. PROTECTIVE CLOTHING AND EQUIPMENT

39.1 Each employee shall be responsible for the proper care of tools and proper care and laundering of protective clothing issued to them.

39.2 New protective clothing and equipment and tools will be issued as required to replace items which are subject to normal wear and tear.

39.3 Employees will be issued with protective clothing, tools and equipment which is suitable for carrying out work safely in the prevailing conditions.

39.4 Employees may be required to replace any protective clothing, tools or equipment which is damaged as a result of misuse or negligence.

39.5 Employees are not permitted to use protective clothing, tools, vehicles or equipment which is provided by Ausgrid while engaged in any employment other than with Ausgrid.

39.6 Employees who are provided with protective clothing shall wear it.

39.7 Ausgrid's policy on protective clothing will be based on the recommendations of the joint employer/employee/union Clothing Committee.

40. HIGHER GRADE PAY

40.1 This clause applies except in the case of employees appointed as Professionals, Managers and Specialists in which case clause 43 applies.

40.2 The introduction of skills-based classifications means that higher grade pay will no longer be applicable within classification groupings because employees will be paid for the full range of duties that they would be expected to use from time to time. Higher Grade duties still apply where employees take on higher responsibilities and duties which are beyond the scope of their classification grouping, e.g. a Technician acting as a Field Co-ordinator, Superintendent etc.

40.3 Employees who are required to carry out duties of a higher grade which are not recognised within the scope of their normal classification grouping shall be paid the appropriate higher rate for the actual period involved, provided they carry out the duties for a minimum of one (1) hour continuously.

40.4 If an employee has been receiving higher grade pay for a continuous period of 13 weeks immediately prior to commencing annual leave, sick leave or accident leave, the employee will be paid the higher grade rate for the duration of the absence. Absences on approved leave of five (5) days or less aggregate duration will not cause a break in continuity for the purposes of this sub-clause. In all cases, the payment of higher grade pay whilst on leave will not exceed six (6) months duration. Breaks in Higher Grade duties of five (5) days or less aggregate duration shall not cause a break in continuity for the purposes of this sub-clause.

40.5 Agreement/Public Holidays during a period of higher grade duty will be paid at the higher rate.

40.6 The higher grade rate will not apply to long service leave or payments made for service entitlements at the termination of employment.

40.7 Higher grade pay is paid to an employee who is required to perform higher grade duties to cover the work of an employee who is absent for more than two (2) days taken as RDOs.

40.8 Undertaking on the job training in a higher graded position does not entitle an employee to higher grade pay unless the person is actually given responsibility for the job, e.g. in a relief role.

40.9 Except where an employee is relieving in a vacancy arising from an employee on approved leave, such as parental leave or long service leave, or the work area is being restructured, a period of higher grade pay shall not continue for more than six (6) months.

41. SUPERANNUATION

41.1 Supplementary Superannuation

This sub-clause applies to employees who:

41.1.1 were employed by Sydney County Council on or before 31 March 1977; and

41.1.2 contributed to the same Local Government Superannuation Scheme on 30 April 1990 that he/she was contributing to on 31 March 1977; and

41.1.3 compulsorily transferred to the State Authorities Superannuation Scheme on May 1990; and

41.1.4 have completed at least 20 years' continuous service with Ausgrid and Sydney County Council; and

41.1.5 retirement age or retired ill-health or was dismissed for reasons other than misconduct or took voluntary redundancy or died whilst still employed.

41.1.6 Employees who meet all the above conditions shall be paid a supplementary superannuation benefit equal to the difference between

$$E = 3.5 + 0.07 (S - 20)$$

Where E = the employee's entitlement measured in weeks of pay per year of service at their ordinary rate

and S = 45 or the total number of years service (including a portion for part completed years to the nearest whole month) whichever is the lesser, and;

41.1.7 The monetary benefits directly attributable to all payments made or to be made in respect of the employee by Ausgrid or any other employer under the provisions of the Local Government and other Authorities (Superannuation) Act 1927 and the State Authorities Superannuation Act 1987 or it successor.

41.1.8 This sub-clause shall not apply to an employee who is a contributor under the provisions of the Superannuation Act 1916.

41.1.9 This sub-clause also applies to employees who were formerly employed by a County Council and who were transferred to Sydney County Council (EnergyAustralia/Ausgrid) on 1 January 1980 provided that,

41.1.9.1 they maintained continuity of service in the transfer

41.1.9.2 they fulfil the requirements in Sub-clause 41.1.1 of this clause

if they meet these criteria, service with Brisbane Waters, St George and MacKellar County Councils prior to being transferred to Sydney County Council (EnergyAustralia/Ausgrid) on 1 January 1980 will be counted in calculating any entitlement under this clause.

41.1.10 This sub-clause applies to employees who were employed by the former Shortland County Council/Orion Energy.

Where the service of an employee is terminated by retirement age, retirement ill health or death, the employee, or in the latter case, his legal representative, shall be paid a severance allowance equal to:

the amount calculated at the rate of the employee's final average salary as defined in Section 24 of Part V of the Public Authorities Superannuation Act, 1985, payable at the date of termination based on 5.616 weeks for each completed year the employee was a contributor under the aforesaid Act and proportionately for any fraction of a year on a monthly basis with a maximum period of 224.64 weeks

less:-

the monetary benefits directly attributable to all payments made or to be made in respect of the employee by the provisions of the Public Authorities Superannuation Act, 1985 those benefits being the amount calculated in accordance with the formula set out in Section 26 of the said Act.

41.1.11 Notwithstanding the above mentioned provisions, the severance allowance payable to an employee or an employee's legal representative shall not exceed a sum equivalent to two

(2) weeks salary or wage for each year of the employee's local government service and proportionately for a fraction of a year on a monthly basis.

41.2 Default Superannuation Scheme

Subject to the provisions of relevant superannuation legislation, employees under this Agreement will have their superannuation contributions paid into the Energy Industries Superannuation Scheme (EISS) unless the employee nominates in writing to the General Manager People & Services or their nominee, an alternative superannuation fund which complies with relevant superannuation legislation.

41.3 Wage Sacrifice To Superannuation

41.3.1 An employee may elect in lieu of being paid an amount of wages to have an equivalent amount paid by way of Superannuation contributions in accordance with the relevant provisions of the EISS.

41.3.2 Where an employee has elected to have an amount paid by way of Superannuation contributions in lieu of wages, any allowance, penalty, payment for unused leave entitlements, weekly worker's compensation or other payment, other than any payment for leave taken in service to which an employee is entitled under this Agreement or any applicable Agreement, Act or Statute which is expressed to be determined by reference to an employee's wage, shall be calculated by reference to the actual wages paid to the employee and the amount paid under Sub-clause 41.3.1 by way of Superannuation contributions.

41.3.3 Subject to the provisions of relevant superannuation legislation, any Superannuation contributions paid under Sub-clause 41.3 shall be paid to the EISS.

41.3.4 The employee may elect to have an amount paid by way of Superannuation contributions in lieu of wages on joining Ausgrid and thereafter may alter the amount paid by way of Superannuation contributions under Sub-clause 41.3 with effect from 1 July each year.

41.3.5 An election to have Superannuation contributions paid in lieu of an amount of wages shall be in writing and may only be made with the consent of both the employee and Ausgrid.

41.4 Additional Employer Superannuation Contribution

41.4.1 All employees will receive a 1% increase to their employer superannuation contribution in addition to their existing arrangements effective from 19 December 2008 (SGC+5% = 14% in total) with a further 1% increase effective from 19 December 2009 (SGC +6% = 15% in total).

41.4.2 Should any increase to the Commonwealth Government Superannuation Guarantee (SGC) occur during the term of this agreement these increases will be absorbed.

41.4.3 Persons covered by this agreement who are in the Defined Benefit Superannuation Scheme will have any SGC increase absorbed in the 6% employer contribution.

42. APPRENTICES

42.1 Apprentices who are appointed to a trades position in Ausgrid shall be paid the appropriate full adult rate.

42.2 When an apprentice reaches the age of 21 they shall be paid the adult apprentice rates in Appendix 1E.

42.3 Internal Adult apprentices will be paid the rate listed in appendix 1E for the duration of their apprenticeship.

42.4 Apprentices may not be required to undertake shift work or overtime where it clashes with their training.

43. PROFESSIONALS, MANAGERS AND SPECIALISTS

43.1 Coverage

43.1.1 This clause 43 applies only to employees classified as "Professionals, Managers and Specialists".

43.1.2 A “Professional, Manager and Specialist” is an employee appointed to a position as a Professional, Manager & Specialist who receives the Ordinary Rate of Pay outlined at Appendix 1C(ii) of the Agreement.

43.1.3 The following clauses of this Agreement do not apply to employees classified as Professionals, Managers and Specialists under this clause 43:

43.1.3.1 Clause 10 – Allowances;

43.1.3.2 Clause 12 – Hours of Work;

43.1.3.3 Clause 14 – Overtime;

43.1.3.4 Clause 15 – On Call;

43.1.3.5 Clause 34 – Rostered Day Off; and

43.1.3.6 Clause 40 – Higher Grade Pay.

43.2 Remuneration

43.2.1 The salaries set out in Appendix 1C(ii) are payable for all purposes and are inclusive of all allowances and hours of work other than:

43.2.1.1 Travel or living expenses when working for Ausgrid. This clause operates with respect to Ausgrid policy and procedure.

43.2.1.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid.

43.2.1.3 Those entitlements inferred under clause 43.6 of this Agreement.

43.2.1.4 A weekly skills retention allowance paid at the frozen rate of $57.08 per week for the term of this Agreement only.

43.2.1.5 Employees who qualify for stage one competency National Professional Engineering Registration shall be paid an allowance at the frozen rate of $74.21 per week.

43.2.1.6 Employees who qualify for stage two competency National Professional Engineering Registration shall be paid an allowance at the frozen rate of $159.83 per week.

43.2.2 Employees covered by this clause 43 are not entitled to Ausgrid Employee Day.

43.3 Fringe Benefits

43.3.1 Employees under this clause 43 shall have access to fringe benefits on the basis of salary packaging arrangements. Any changes to fringe benefits tax (FBT) rates or method of calculation will be passed on to employees immediately.

43.3.2 Salary Packaging is limited to the following items:

43.3.2.1 Motor Vehicle(s)

43.3.2.2 Superannuation

43.3.2.3 Child Care

43.3.2.4 Health Benefits

43.3.2.5 Mortgage

43.3.2.6 Laptop Computer

43.3.2.7 Income Protection

43.3.2.8 Other benefits as may become available from time to time.

43.3.2.9 Employees are responsible for meeting 100% of any FBT cost incurred through salary packaging.

43.3.2.10 Motor vehicle arrangements are subject to the conditions and provisions of Ausgrid's Motor Vehicle Policy as amended by Ausgrid from time to time.

43.3.3 All salary packaging arrangements must be prospective (i.e. forward looking) and all arrangements must be provided in writing. Similarly, salary packaging arrangements may be revoked upon provision of written notice.

43.3.4 Employee nominated fringe benefits will be paid fortnightly to those financial institutions nominated by the employee (except in the case of hardship).

43.4 Hours of Work

43.4.1 The hours of work for employees covered by this clause 43 will be 40 hours per week, Monday to Friday. This will involve working eight (8) hours per day over a five (5) day week or 160 hours per four weeks over 19 days at employee election.

43.4.2 Employees covered by this clause 43 will be available as required to perform such other reasonable additional hours that may be necessary to meet the needs of the position.

43.4.3 Employees covered by this clause 43 agree that these ordinary hours are reasonable. Ausgrid will not require any employee to work any hours that are unreasonable.

43.4.4 In accordance with the NES, if any employee covered by this clause 43 wishes to reduce his or her hours of work:

(a) the employee must identify the basis on which the additional hours above 38 hours per week are unreasonable; and

(b) Ausgrid will not unreasonably deny the employee's request to reduce his or her hours;

(c) the employee's salary will be reduced pro rata in accordance with the reduction in the employee's hours.

43.4.5 If Ausgrid and the employee cannot agree on the employee's hours of work under this clause, either party may refer to matter to the Disputes clause of this Agreement.

43.4.6 Employees under this clause 43 are not entitled to Rostered Days Off.

43.5 Overtime

43.5.1 Overtime will only be paid with the approval of the relevant General Manager (or their delegate). Where it is paid, overtime will be paid in accordance with clause 14.

43.5.2 The employee and their manager may agree to time off work without deduction from salary for other than incidental overtime.

43.6 Duties as Directed

43.6.1 The relevant General Manager may direct employees under this clause 43to carry out such duties at their normal place of employment or other locations (by consultation) as may be required from time to time provided that the duties are within the employee's skill, competence and training, satisfy any relevant professional code of ethics and do not pose a substantial risk of death or personal injury to any person.

43.7 Multiskilling of Positions

43.7.1 The persons covered by this clause 43 acknowledge that the interests of Ausgrid can be enhanced by the redesign of specific positions and that multiskilling may be appropriate.

43.7.2 All employees covered by this clause 43 may be required by the employer to undertake a reasonable and necessary level of training to facilitate the employee in question being able to perform more and/or different functions and duties than he/she may have performed in the past. This requirement shall be commensurate with, and have regard to, the employee's training, skills and competence to perform such functions and duties to satisfactory and safe standards.

43.8 Acting in Positions

43.8.1 Employees who are not employed in a job covered by this clause 43 but who act in a position covered by this clause 43shall be paid the salary for the position the appropriate level of remuneration and shall work in accordance with the conditions of this clause 43while acting. Employees who are covered by this Agreement but are not covered by clause 43 who act in a Professionals, Managers and Specialists position will not be entitled to either take or accrue rostered days off during the period of so acting.

43.8.2 Employees who are covered by this clause 43and act in another job covered by this clause 43shall receive the appropriate salary for the job in which they are acting.

43.8.3 Employees who are covered by this clause 43and who act in a senior contract position shall continue under the conditions of this clause 43but shall be paid according to the minimum remuneration for the said senior contract position or their current rate, whichever is the greater. General Managers/ managers may review and set the higher grade rate where applicable.

43.8.4 If an employee takes any form of leave during the first 13 weeks of the acting higher grade, the period of leave will not attract the higher rate of payment.

43.9 Miscellaneous

43.9.1 Employees in positions covered by this clause 43 who are redeployed to a lower graded position shall have their salaries and benefits adjusted in line with prevailing Ausgrid policy on salary maintenance.

43.9.2 No employee shall be appointed or promoted to a position under this clause 43 without first going through a competitive selection process. All positions will be the subject of selection

by merit only and at the sole decision of the employer. This clause, at all times, is subject to the conditions and provisions of Ausgrid's Merit Appointment Policy.

44. ENGINEERS

44.1 Coverage

44.1.1 This clause 44 applies only to employees classified as Engineers.

44.1.2 An "Engineer" is an employee appointed to a position as an Engineer who receives the Ordinary Rate of Pay outlined at Appendix 1C(i) of the Agreement.

44.1.3 No employee shall be appointed to a position under this clause 44 without first going through a competitive selection process. All positions will be the subject of selection by merit only and at the sole decision of the employer. This clause, at all times, is subject to the conditions and provisions of the Ausgrid's Merit Appointment Policy.

44.2 Salary

1.1 The salaries outlined in Appendix 1C(i) above are payable for all purposes and are inclusive of all allowances other than:

44.2.1.1 Travel or living expenses when working for Ausgrid. This clause operates with respect to Ausgrid Agreement 2014 and policy and procedure.

44.2.1.2 Reimbursement of business related/educational expenses incurred in the course of employment with Ausgrid. Employees should refer to the relevant Ausgrid policies and procedures for more information in respect of this clause.

44.2.1.3 Any entitlements to Overtime under clause 14.

44.2.1.4 On Call Allowances as outlined in clause 15.

44.2.1.5 First Aid Allowance as outlined in clause 10.11.

44.2.1.6 Meal Allowance as outlined in clause 17.

44.2.1.7 Private Vehicle Usage – ATO Rates as outlined in the Ausgrid Agreement 2014.

44.2.1.8 Employees who qualify for stage one competency National Professional Engineering Registration shall be paid an allowance at the frozen rate of $74.21 per week.

44.2.1.9 Employees who qualify for stage two competency National Professional Engineering Registration shall be paid an allowance at the frozen rate of $159.83 per week.

44.3 Progression

44.3.1 Band 1 progression

44.3.1.1 Engineers appointed to band 1 shall spend a minimum of twelve months at each level before being eligible to progress to the next level. A satisfactory Performance Development System (PDS) result (in accordance with Clause 6) is required each year in order to progress. An engineer shall complete a minimum of 24 months service in band 1 before becoming eligible for appointment to an advertised band 2 position. Shorter periods of service on the program are subject to the approval of EGM-HR or their delegate.

44.3.2 Band 2 progression

44.3.2.1 Progression from band 1 to band 2 will be by Merit Appointment only.

44.3.2.2 Appointments to band 2 level positions will be made to the Division, meaning that the employee will be required to move from their appointed position to meet the needs of the Division or as part of a development plan established with their Branch or Division manager.

44.3.2.3 To progress from band 2 Level 1 to band 2 Level 2 an Engineer must be able to demonstrate:

(A) satisfactory PDS results for two consecutive years at band 2 Level 1.

44.3.2.4 To progress from band 2 Level 2 to band 2 Level 3 an Engineer must be able to demonstrate:

(A) satisfactory PDS results for three consecutive years at band 2 Level 2, and

(B) that they have moved to a new position at band 2 level 2 for 18 months since their original appointment to band 2 (this maybe a longer or shorter period depending on individual development or business need but will not be less than 12 months).

44.3.2.5 To progress from band 2 Level 3 to band 2 Level 4 an Engineer must be able to demonstrate

(A) satisfactory PDS results for four consecutive years at band 2 Level 3, and

(B) that they are currently registered on the National Professional Engineers Register (NPER) or have obtained Chartered Professional Engineer status.

44.3.3 Band 3

44.3.3.1 Band 3 positions will no longer be advertised and exist on a present occupant only basis. Positions graded at this level for engineers will be placed on the Professional, Managers & Specialist Enterprise Agreement.

44.3.3.2 Engineers on band 3 Level 1 will transition under this agreement to band 2 Level 4 at the same pay point.

44.3.3.3 Progression outside the provisions of clauses 5.1-5.5 may occur with the approval of the relevant General Manager, in recognition of exceptional achievement, performance, higher workload, or to cater for business needs.

44.4 Performance Development System

44.4.1 The performance development process involves engineers and their manager determining what needs to be done during the year, discussing progress, reviewing achievement and

giving feedback. Work plans are focused on our corporate goals and single set of shared goals.

44.4.2 A formal performance progress review should be carried out with the manager or supervisor six (6) months after you have agreed your work plan objectives. The final performance review shall then be carried out at the end of twelve (12) months. The performance development system cycle operates on a financial year basis.

44.5 Overtime

44.5.1 Employees covered by this clause 44 who are required to perform other than incidental overtime will be paid at the appropriate rate of overtime as set out in clause 14.

44.6 Duties as Directed

44.6.1 The relevant General Manager may direct employees under this clause 44 to carry out such duties at their normal place of employment or other locations (by consultation) as may be required from time to time provided that the duties are within the employee's skill, competence and training.

44.7 Multiskilling of Positions

44.7.1 The persons covered by this clause 44 acknowledge that the interests of Ausgrid can be enhanced by the redesign of specific positions and that multiskilling may be appropriate.

44.7.2 All employees covered by this clause 44 may be required by the employer to undertake a reasonable level of training to enhance the employee's skill level. This requirement shall be commensurate with and have regard to the employee's training, skills and competence to perform such functions and duties to satisfactory and safe standards. Wherever a position is redesigned or multiskilling of an existing position is identified as a desired outcome, consultation with the affected work group/individual shall take place.

44.8 Acting in Positions

44.8.1 Employees who act in a position covered by this clause 44shall be paid the salary for the position as described in Appendix 1C(i) and in accordance with the conditions of this clause 44 while acting.

44.8.2 Employees who are covered by this clause 44 and who act in a Senior Contract position shall continue under the conditions of this Agreement but shall be paid according to the minimum remuneration for the said Senior Contract position or their current rate, whichever is the greater. General Managers/ managers may review and set the higher grade rate where applicable. Employees who are covered by this clause 44 who act in a senior contract position will not be entitled to either take or accrue rostered day off during the period of so acting.

45. MISCELLANEOUS CONDITIONS OF EMPLOYMENT

45.1 An employee who is on or below Pay Point 40 and is required to be an authorised motor vehicle driver or who is required to hold a licence to operate plant or equipment, will have the cost of that licence(s) reimbursed.

45.2 Nominated employees who are required to take or make business calls at home will be reimbursed the cost of telephone rental and/or business calls as determined by Ausgrid or provided with a mobile phone.

45.3 On the death of an employee, all their outstanding entitlements and accruals will be paid to their estate except where the employee has provided a written instruction to pay them to next of kin.

45.4 An employee who is authorised and agrees to use a private motor vehicle in the course of their employment shall be paid the rate in Appendix 1D, Extra Rates, Item No. 23, if the employee maintains the minimum of third party property damage insurance policy on that vehicle. However:

45.4.1 employees without a company vehicle must, wherever possible, use an Ausgrid vehicle when travelling for business purposes;

45.4.2 employees with a company vehicle must use that Ausgrid vehicle when travelling for business purposes.

45.5 Where an employee is supplied with a residence (with or without concessions) the weekly value of such residence (and concessions) shall be agreed upon from time to time between the persons covered by this Agreement and in the event of failure to agree, shall be dealt with pursuant to the disputes procedures contained in Clause 4.

46. NO EXTRA CLAIMS

It is a term of this Agreement that the persons covered by this Agreement undertake that for the period of the duration of this Agreement that they will not pursue any extra claims, Agreement or over Agreement.

47. UNION DELEGATES' CHARTER

47.1 Ausgrid shall be able to:

47.1.1 Expect that employees, be they Union Delegates or not, will perform the job in which they are employed.

47.1.2 Be given reasonable notice by Delegates that they intend to carry out their Union duties.

47.1.3 Expect that Union Delegate(s) shall not be able to claim or be paid overtime for attendance at Delegates meetings organised during normal working hours.

47.2 Union Delegates shall be able to:

47.2.1 Approach, or be approached by a member for the payment of Union dues or other payments, or to discuss any matter related to this member's employment, during working hours.

47.2.2 After obtaining the permission of the employer, move freely for the purpose of consulting other Delegates during working hours.

47.2.3 To negotiate with management together with other union delegates on behalf of all or part of the members on any matters in accord with Union policy affecting the employment of members who work in Ausgrid.

47.2.4 Call meetings and for members to attend these meetings on the job. Such meetings are to be outside of work time unless prior permission is obtained from management.

47.2.5 Have protection from victimisation and this right to be expressed in prohibiting the employer from seeking to separate the delegate from the union members who elected them without first consulting the union.

47.2.6 Have access to a telephone and computer, including email and to have within their work proximity suitable cupboards and furniture to enable them to keep records, union circulars, receipt books etc. so as to efficiently carry out their union responsibilities.

47.2.7 Attend meetings and training held by the Union in which they hold office without loss of any rights following the approval of Ausgrid. Attendance at these meetings shall be permitted according to the provisions of Clause 27 Special Leave of this Agreement.

47.2.8 Have all agreements and arrangements negotiated with Ausgrid set out in writing and for these agreements and arrangements, including Agreements, to be provided to delegates on request.

47.2.9 Place notices on defined union notice boards.

Signed for and on behalf of:

Ausgrid		570 George Street Sydney NSW 2000 Date
Communications, Electrical, Electronic, Energy, Information, Postal, Plumbing and Allied Services Union of Australia		Level 5, 370 Pitt Street Sydney 2000 Date
Australian Municipal, Administrative, Clerical and Services Union New South Wales United Services Branch		Level 7, 321 Pitt Street Sydney NSW 2000 Date
Association of Professional Engineers, Scientists and Managers Australia		Level 1, 491 Kent Street Sydney NSW 2000 Date
Community and Public Sector Union		160 Clarence Street Sydney NSW 2000 Date
Australian Workers' Union		16-20 Good Street Granville NSW 2142 Date
Construction, Forestry, Mining and Energy Union (Mining and Energy Division) NSW Branch		Level 1, 365-375 Sussex Street Sydney NSW 2000 Date
Australian Manufacturing Workers' Union (Vehicle Division)		Level 1, 133-137 Parramatta Road Granville NSW 2142 Date

APPENDIX 1 PAY RATES CLASSIFICATIONS AND ALLOWANCES

Appendix 1A Ausgrid Junior and Adult Rates of Pay

Appendix 1B Ausgrid Shift Workers (7x3/7x2) Rates of Pay

Appendix 1C Ausgrid Classifications

Appendix 1D Ausgrid Allowances and Extra Rates

Appendix 1E Ausgrid Adult Apprentice Rates of Pay

Appendix 2 Annual Leave Conversion

Appendix 1A Ausgrid Junior and Adult Rates of Pay

Pay Point	New Rates from Certification			New Rates from 12 months after Certification		
	Annual Salary	Weekly Rate	36 Hrly Rate	Annual Salary	Weekly Rate	36 Hrly Rate
J1						
J2						
J3						
J4						
J5						
J6						
J7						
J8						
J9						
J10						
J11						
J12						
J13						
J14						
J15						
J16						
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J18						
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Appendix 1B Ausgrid Shift Rates of Pay

Pay Point	New Rates from Certification			New Rates from 12 months after Certification		
	Annual Salary	Weekly Rate	Hourly Rate	Annual Salary	Weekly Rate	Hourly Rate
10Y						
11Y						
12Y						
13Y						
14Y						
15Y						
16Y						
17Y						
18Y						
19Y						
20Y						
21Y						
22Y						
23Y						
24Y						
25Y						
26Y						
27Y						
28Y						
29Y						
30Y						
31Y						
32Y						
33Y						
34Y						
35Y						
36Y						
37Y						
38Y						
39Y						
40Y						
41Y						
42Y						
43Y						
44Y						
45Y						
46Y						
47Y						
48Y						
49Y						

Appendix 1C Ausgrid Classification

Trades and Technical Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5	6	7	8	9	10
Aborist Contract Inspection	36									
Adult Apprentice	J18	2	4	6						
Apprentice	J10	J14	J17	2						
Area/System Operator	[insert pay points]									
Area Operator – annualised	48	50	52							
Asset Access Rescue	22									
Asset Access Standby	18									
Asset Research Officer	26									
Assistant System Operator Wallsend	[insert pay points]									
Building Maintenance Coordinator	30									
Building Maintenance Coordinator ext subs	45									
Building Maintenance Coordinator Property Group	40									
Cable Jointer	15	17	18	19	20	22	23	24		
Carpenter	15	16	18	19	20	21				
Chemical Officer	33									
Compliance Officer	36	38	40							
Consultant Engineering	48									
Consultant Engineering Consulting	53									
Contracts Inspector	40									
Contracts Officer	46									
Co-ord net cln & gr mnt	24									
Customer Operations Technical Field Support	32									
Deregulation Management Coordinator	48									
Design Draftsperson	18	21	25	28	32	35	38			
Despatch Co-ordinator	33	37	43							
District Operator	32	41								
Drafting Officer Network Diagrams	29									
Editorial Design Officer	32									
Electrical Field Co-ordinator	38									
Electricity Supply Operative	5	6	7	8	9	10	11	12		
Emergency Services Officer	20	23	26	29	30	32	34			
Energy Fix Project Co-ordinator	43									
Engineering Officer	29	34	37	40	43	46	49	52		
Ens cus conn tech snr	24	26								
Ens Customer Connection Technician	15	18	21							
External Customer Metering Officer	45									
Facilities Compliance Co-ordinator	36									
Facilities Manager	48									
Field Co-ordinator t/cont	38									
Field Investigation Technician	15	18	21	24	26					
Field off acct rdng	19									

Trades and Technical Group

Field Services Storeperson West Gosford	21								
Field Warehouse Operative	14	16	18	20					
Fleet Assessment and Compliance Officer	43								
Ganger	28	30							
Garage Trades Assistant	17								
Geospatial Information Officer	20	24	29	33	38				
Heavy Vehicle Driver	9	12	14	16	20				
Homebush Garage Storeman	21								
Hunter Project Co-ordinator	43								
Independent Transmission Cable Jointer	30								
Installation Inspector	26	30	33	35	39				
Instructor Technical and Safety	36								
Internal Adult Apprentice	15								
Lane Cove Supply Operative	21								
Leading Hand Vehicle Body Builder	31								
Learning and Resource Development Officer	47								
Light Fleet Acquisition & Maintenance Officer	38								
Line Inspector	20								
Lineworker	15	17	18	19	20	22	23	24	
Lineworker Glove and Barrier	31								
Mains recorder	16	18	20						
Meter Warehouse Superintendent	21								
Metering Operations Co-ordinator	41								
Metering Technician	18	20	22	24	26	28	30	32	
Mobile Purchasing and Parts Delivery Storeperson	21								
Motor Mechanic	15	17	19	20	24	25	26	28	
Motor Mechanic in Charge	31								
Network and Customer Field Officer	30								
Network Test Electricity Supply Operative	19								
Oil Containment Electricity Supply Operative	16								
Oil Containment Officer	41								
Operating supp asst.	19								
Outage Scheduling Officer	52								
Overhead Field Co-ordinator	36								
Overhead Transmission Electricity Supply Operative	9	11	14	12	20				
Overhead Working Leading Hand	33								
Plant and Motor Vehicle Inspector	29								
Plasterer	18								
Plumber	15	16	18	19	20	21			
Pole Hole b/e Operator	19								
Pole Inspector	12	16							
Poles Leading Hand	24								
Printer	12	22							
Proc off forest prod	40								
Project Delivery Officer	36	38	40	43	45				

Trades and Technical Group

Projects Officer Training	40								
Protection Field Co-ordinator	38								
Protection Technician	21	24	25	27	31	32	33	35	
Quality Control Officer	27	29	33						
Recording Supervisor	47								
Region Electricity Supply Operative	9	11	14	17	20				
Revenue Protection Officer	38								
Rigging Co-ordinator	22								
Risk Mitigation Technician	22								
Safety Advisor	38	42							
Safety Advisor Snr	48								
Safety Advisor DOR	39	43							
Safety Advisor DOR Snr	49								
Security Operations Officer	29								
Senior Asset Access Rescue	32								
Senior Carpenter	23	26	28						
Senior Design Structural Draftsperson	26								
Senior District Operator	44								
Senior Editorial Design Officer	38								
Senior Electrical Designer	42								
Senior Electrical Technician	23	25	26	28					
Senior Field Investigation Technician	30								
Senior Installation Inspector	40								
Senior lab mains u/g	23								
Senior national mkt part off	42								
Senior Plumber	26	28							
Senior Safety Advisor	48								
Senior Substation Technician	25	28	29	31	32	33			
Senior Technician	23	25	26	28	29	30			
Senior Telecontrol Technician	36								
Senior Training Officer	45								
Senior Transformer Service Technician	25	28	29	31	32	33			
Senior instr op stds & accred	42	45							
Special Meter Reader	12								
Specialist Project Officer Contract Cable Laying	48								
Substation Field Co-ordinator	38								
Substation Risk Mitigation Field Co-ordinator	38								
Substation Technician	15	18	20	21	22	23			
Superintendent	47	49	51						
Superintendent Level O	45								
Supervising Engineering Officer	54								
Supervisor	28	30	32	35	38	42			
Survey Officer	22	26	29	33	36	39	42	45	
System Operator Wallsend	[insert pay points]								
System Operator (annualised)	57								

Trades and Technical Group

TCA Procurement and Contracts Coordinator	49								
TCA Technician	17	19	21	23	25	27	29	31	
Team Coordinator	38								
Tech cust supp serv	15	17	19	21					
Tech elec serv	15	18	20	21	22	23			
Tech elec srv snr	25	28	29	31	32	33			
Tech inst	18	22	26	28	32	36	38	40	
Tech inst snr	42	45							
Tech spec meter snr	36								
Tech spec sup srv snr	27								
Tech supp serv snr	25								
Technical & Information Technology Support Officer	31								
Technical and Training Coordinator	42								
Technical Editor	29	34	37	40	43	45	49	52	
Technician	15	16	18	19	20	21			
Telecontrol Technician	21	24	26	28	31	32	34	35	
Trainee District Operator	23								
Trainee Engineering Officer	J14	J18	9	14	21				
Trainee Pole Inspector	8								
Training Officer	38								
Trans civil inspector	38								
Transformer Service Technician	15	18	20	21	22	23			
Transmission Cable Electricity Supply Operative	8	10	13	16	19				
Transmission Cable Jointer Trainer	34								
Transmission Oil Technician	21	24	26	28	31	34	36		
Transmission Underground ESO	9	11	14	17	20				
Underground Field Co-ordinator	36								
Vegetation Officer	38								
Vehicle Body Builder	15	17	19	20	24	25	26	28	
Voltage Regulation Technician	21	24	25	26	27	29	31	33	
Voltage Regulation Field Coordinator	38								
Warehouse Officer External Sales	21								
Warehouse Operative	10	12	14	16	18	20	22		
Workshop Electricity Supply Operative	9	11	14	17	20				
Workshop Production Planner	23								
Workshops Technician	15	17	19	20	21	23	25	27	

Clerical and Administrative Group

GRADES/LEVEL/PAYPOINT	**1**	**2**	**3**	**4**
Admin & Clerical Officer Grade 1	J14	J16	J18	
Admin & Clerical Officer Grade 2	1	3	5	
Admin & Clerical Officer Grade 3	6	8	10	
Admin & Clerical Officer Grade 4	11	13	15	
Admin & Clerical Officer Grade 5	16	18	20	
Admin & Clerical Officer Grade 6	21	23	25	

GRADES/LEVEL/PAYPOINT	1	2	3	4
Admin & Clerical Officer Grade 7	26	28	30	
Admin & Clerical Officer Grade 8	31	33	35	
Admin & Clerical Officer Grade 9	36	38	40	
Admin & Clerical Officer Grade 10	41	43	45	
Admin & Clerical Officer Grade 11	46	48	50	
Admin & Clerical Officer Grade 12	51	52	53	
Contracts Administrator	44			
Customer Service Representative	26			
Depot Recorder	17			
Fleet Business Analysis & System Administration	26			
Security Attendant	18			
Security Surveillance Operative	18			
Student Work Experience	2			
Telephone acct rep	42			
Telephonist	21			

Professional Management and Specialist Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5
Accountant	51	53	57		
Accountant Grade 1	22	26	31	35	39
Accountant Grade 2	42	45			
Accountant Grade 3	47	49			
Professional Officer Grade 1	22	26	31	35	39
Professional Officer Grade 2	42	45			
Professional Officer Grade 3	47	50			
Snr a/c mgr inst	52				

APPENDIX 1C(i)

Engineering Group

GRADES/LEVEL/PAYPOINT	1	2	3	4	5
Cadet Engineer	J4	J6	J8	2	4
Engineer Band One	25	29	34	38	41
Engineer Band Two	46	49	53	55	

APPENDIX 1C(ii)

Professionals, Managers and Specialists

	Annual Salary		
	On Certification	12 months after Certification	24 months after Certification
Level 1	$	$	$
Level 2	$	$	$

Level 3	$	$	$

Appendix 1D Ausgrid Allowances and Extra Rates

Item	Code	Allowance Type		Rate		
			Frequency	On Certification	12 months after Certification	24 months after Certification
1.	SHA	Afternoon Shift	per shift	$	$	
2.	NGT	Night Shift	per shift	$	$	
3.	EMSRA	Early Morning Shift	per shift	$	$	
4.	O/C	On Call	per week	$	$	
5.	O/C1	On Call Weekday	per day	$	$	
6.	O/C2	On Call Weekend	per day	$	$	
7.	MEAL	Meal	per meal	$	$	
8.	CDMB	Charge Depot Meal Break	per day	$	$	
9.	CPLB	Charge Plant Meal Break	per day	$	$	
10.	ASB	Asbestos	per hour	$	$	
11.	ASE	Asbestos Eradication	per hour	$	$	
12.	COMM	Community Language Allowance	per week	$	$	
13.	SUST	Sustenance Allowance - pre paid accommodation	per day	$	$	
		single location up to 35 days - no prepaid accommodation	per day	$	$	
		single location after 35 days - no prepaid accommodation	per day	$	$	
14.	SKR	Skills Retention	per week	$	$	
15.	SR	Electrical Safety Rules Allowance	per week	$129.89	$129.89	
16.	SREO	ESO Safety Rules -60%	per week	$77.94	$77.94	
17.	SR80	Non-Elec Trade Safety Rules - 80%	per week	$103.92	$103.92	
18.	EL	Qualified Electrical Supervisor	per week	$	$	
19.	PRA	Plumber's Registration Allowance	per week	$	$	$26.92
20.	PTA	Plumbers Tool	per week	$	$	
21.	PLTA	Plasterers Tool	per week	$	$	
22.	CTA	Carpenters Tool	per week	$	$	
23.	VEH	Private Vehicle Usage	per klm	ATO Rates		
24.		First Aid Attendant Allowance				
25.		Occupational First Aid Attendant Allowance	Per day	$10.00	$10.00	$10.00

Appendix 1E: Ausgrid Adult Apprentice Rates

Classification	New Rates From		
	Certification	12 months after Certification	24 months after Certification
1st Year Adult Apprentice	$	$	
2nd Year Adult Apprentice	$	$	
3rd Year Adult Apprentice	$	$	
4th Year Adult Apprentice	$	$	
Internal Adult Apprentice	$	$	

APPENDIX 2 ANNUAL LEAVE CONVERSION

METHOD FOR CONVERTING ANNUAL LEAVE AND SICK LEAVE ENTITLEMENTS TO HOURS

This applies to Ausgrid's employees whose ordinary hours of work equal 72 per fortnight.

Employees accrue either 15 or 18 days of sick leave per year, depending on length of service. They also have a statutory entitlement to four (4) weeks annual leave including non working days. Shift workers have an annual leave entitlement of 20 or 25 shifts.

The method of work for these employees is to work eight (8) hours per day over a nine (9) day fortnight. Day workers work five (5) days in the first week and four (4) days in the second. Shift workers average nine (9) days per fortnight over their full roster. Day workers are paid at the appropriate rate for a 36 hour week but actually work 40 hours in the first week and 32 in the second. They work eight (8) hours per day and are paid for eight hours per day RDO. Shift workers are paid according to the actual hours worked each week.

This Agreement provides amongst other things, for the possibility of work being organised into nine (9) hour day/four (4) day weeks and 12 hour day/three (3) day weeks. This requires all sick leave and annual leave entitlements to be recorded in hours and debited in hours.

Sick leave and annual leave are converted to hours according to the following methods. Employees are entitled to 18 days of sick leave and work an eight hour day. Therefore, the annual sick leave entitlement is 144 hours. The annual leave entitlement is also 144 hours because four weeks work is equivalent to four times 36 hours per week.

All sick leave is debited according to the ordinary hours actually worked each day. If the ordinary hours are eight (8), nine (9) or 12 per day then eight (8), nine (9) or 12 hours respectively will be deducted for each day of absence on sick leave.

All annual leave for employees who work a nine (9) day fortnight is deducted at eight (8) hours per day.

Other employees who work shiftwork or nine (9) or 12 ordinary hours per day will have the actual ordinary hours debited from their annual leave. For example, an employee who works 12 ordinary hours per day will only work three (3) days per week. If 12 hours is debited for each day of annual leave, the employee is still entitled to four weeks of annual leave at three days/week.

Similar arrangements will be made for employees who work a 35 hour week.

SCHEDULE 1 – ATTACHMENT which is attached for clarity but is not part of the agreement

This Schedule 5 contains:

Employers recognised for Prior Service

Employers Recognised for Prior Service

Recognised NSW Government Departments as at 26 July 1996

Department of Aboriginal Affairs
Ageing and Disability Department
Department of Agriculture
Ministry for the Arts, including Powerhouse Museum
Attorney General's Department
The Audit Office of New South Wales
Office of the Board of Studies
Building Services Corporation
Department of Bush Fire Services
Department of Business and Regional Development
Cabinet Office
Community Services Commission
Motor Accidents Authority
National Parks and Wildlife Service
New South Wales Fire Brigades
New South Wales Meat Industry Authority
Olympic Co-ordination Authority
Ombudsman's Office
Parliamentary Counsel's Office
Ministry for Police and Emergency Services
Premiere's Department
Public Trust Office
Department of Public Works and Services
Royal Botanic Gardens and Domain Trust
Rural Assistance Authority
Department of School Education
Department of Sport and Recreation
Department of State Development
State Electoral Office
State Emergency Service
State Forests, Forestry Commission
Tourism New South Wales
Department of Training and Education Co-ordination
Department of Transport
The Treasury
Department of Foreign Affairs
Department of Corrective Services
New South Wales Crime Commission
New South Wales Dairy Corporation
Darling Harbour Authority
Department of Community Services
Office of the Director of Public Prosecutions
Department of Energy
Environment Protection Authority
Ethnic Affairs Commission
NSW Fisheries
Forestry Commission (except State Forests)
Department of Gaming and Racing
Department of Health Care Complaints Commission

Recognised NSW Government Departments as at 26 July 1996

Home Purchase Assistance Authority
HomeFund Commissioner's Office
Department of Housing
Department of Industrial Relations
Department of Juvenile Justice
Department of Land and Water Conservation
Legal Aid Commission
Department of Local Government
Department of Mineral Resources
Department of Urban Affairs and Planning
Department for Women
WorkCover Authority

List of Recognised NSW Authorities

Maritime Services Board
Water Conservation and Irrigation Commission
Department of Main Roads (RTA)
Metropolitan Water, Sewerage and Drainage Board (Sydney Water)
Police Force
Department of Railways (State Rail)
Department of Government Transport (State Transit Authority)
Department of Motor Transport
Milk Board
The Legislature
Metropolitan Meat Industry Board
Electricity Commission (PacPower / Transgrid)
Hunter District Water Board
Board of Fire Commissioners of New South Wales
Broken Hill Water Board
State Mines Control Authority
Grain Elevators Board of New South Wales
State Planning Authority of New South Wales
Cobar Water Board
Homebush Bay Ministerial Corporation
State Superannuation Investment and Management Corporation
TAFE Commission
The Auburn District Hospital
The Balmain Hospital
The Bankstown Hospital
The Canterbury District Memorial Hospital
The Eastern Suburbs Hospital
The Fairfield District Hospital
The Hornsby and District Hospital
The Langton Clinic (Moore Park)
The Liverpool District Hospital
The Manly District Hospital
The Marrickville District Hospital
The Mona Vale Hospital
The Parramatta District Hospital
The Prince Henry Hospital
The Prince of Wales Hospital
The Rachel Forster Hospital'
The Royal North Shore Hospital of Sydney
The Royal South Sydney Hospital
The Ryde District Soldiers' Memorial Hospital
The St George Hospital
The Sutherland Hospital
The Sydney Hospital
The Sydney Homoeopathic Hospital
The Sydney Home Nursing Service
The Western Suburbs Hospital
The Women's Hospital (Crown Street)
The Karitane Mothercraft Society in respect of: Karitane Mothercraft Training Centre, Woollahra
The Australian Red Cross Society in respect of : Blood Transfusion Service; The Graythwaite Red Cross Home, North Sydney; Eleanor Mackinnon Junior Red Cross Home, Cronulla; The Lady Gowrie Red Cross Convalescent Home, Gordon; Berida Junior Red Cross Home; The Bodington Red Cross Hospital
The Benevolent Society of New South Wales in respect of: The Royal Hospital for Women: Scarba (Bondi)
NSW College of Nursing
New South Wales Society for Crippled Children in respect of: Margaret Reid Home, St Ives: Cleveland Hospital and Clinic for Crippled Children (Surry Hills)
Beverley Park Home, Campbelltown
The Carrington Centennial Hospital for Convalescents
The Royal Ryde Homes
Royal Society for the Welfare of Mothers and Babies in respect of: The Carpenter Mothercraft Home, Wollstonecraft; The Tresillian Homes at Petersham, Vaucluse and Willoughby
United Dental Hospital
The Adelong Hospital
The Albury Base Hospital
The Armidale and New England Hospital, Armidale
The Ballina District Hospital
The Balranald District Hospital
The Bangalow District (War Memorial) Hospital
The Barham and Koondrook Soldiers' Memorial Hospital
The Barraba Hospital
The Bateman's Bay District Hospital
The Bathurst District Hospital
The Batlow District Hospital
The Bega District Hospital
The Bellinger River District Hospital
The Berrigan War Memorial Hospital
The Bowral and District Hospital
The Bingara District Hospital

The Blacktown District Hospital
The Blayney District Hospital
The Blue Mountains District Anzac Memorial Hospital
The Boggabri District Hospital
The Bombala District Hospital
The Boorowa District Hospital
The Bourke District Hospital
The Braidwood District Hospital
The Brentwood Hospital, Muswellbrook
The Brewarrina District Hospital
The Broken Hill and District Hospital
The Bulahdelah District Hospital
The Bulli District Hospital
The Byron District Hospital
The Camden District Hospital
The Campbell Hospital, Coraki
The Canowindra Soldiers' Memorial Hospital
The Carcoar District Hospital
The Casino and District Memorial Hospital
The Cessnock District Hospital
The Cobar District Hospital
The Coffs Harbour and District Hospital
The Coledale District Hospital
The Collarenebri District Hospital
The Condobolin District Hospital
The Coolah District Hospital
The Cooma District Hospital
The Coonabarabran District Hospital
The Coonamble District Hospital
The Cootamundra District Hospital
The Corowa Hospital
The Cowra District Hospital
The Crookwell District Hospital
The Cudal War Memorial Hospital
The Culcairn District Hospital
The Delegate District Hospital
The Deniliquin Hospital
The Dorrigo Hospital
The Dubbo Base Hospital
The Dunedoo War Memorial Hospital
The Dungog and District Hospital
The Eugowra Memorial Hospital
The Finley Hospital
The Forbes District Hospital
The Gilgandra District Hospital
The Glen Innes District Hospital
The Gloucester Soldiers' Memorial Hospital
The Goodooga District Hospital
The Gosford District Hospital
The Goulburn Base Hospital,
The Governor Phillip Special Hospital (Penrith)
The Gower Wilson Memorial Hospital, Lord Howe Island
The Grafton Base Hospital
The Aruma Home (Grafton)
The Grenfell District Hospital
The Griffith Base Hospital
The Gulgong District Hospital
The Gundagai District Hospital
The Gunnedah District Hospital
The Guyra District War Memorial Hospital
The Hastings District Hospital
The Hawkesbury Benevolent Society and Hospital
The Hay Hospital
The Henty District Hospital
The Hillston District Hospital
The Holbrook District Hospital
The Inverell District Hospital
The Ivanhoe District Hospital
The Jerilderie District Hospital
The Junee District Hospital
The Kiama District Hospital
The Kyogle Memorial Hospital
The Kurri Kurri District Hospital
The Lake Cargelligo District Hospital
The Leeton District Hospital
The Lismore Base Hospital
The Lithgow District Hospital
The Lockhart and District Hospital
The McCaughey Memorial Hospital, Urana
The Macksville and District Hospital
The Maclean (Lower Clarence) Hospital
The Macleay District Hospital
The Maitland Hospital
The Manilla District Hospital
The Manning River District Hospital
The Merriwa District Hospital
The Milton-Ulladulla Hospital
The Molong District Hospital
The Moree District Hospital
The Moruya District Hospital
The Mudgee District Hospital
The Mullumbimby and District War Memorial Hospital
The Murrumburrah-Harden District Hospital
The Narrabri District Hospital
The Narrandera District Hospital
The Narromine District Hospital

The Nepean District Hospital
The Newcastle Western Suburbs Maternity Hospital
The Nimbin District Memorial Hospital
The Nyngan District Hospital
The Oberon District Hospital
The Old Folks' Home (Broken Hill)
The Orange Base Hospital
The Pambula District Hospital
The Parkes District Hospital
The Port Kembla District Hospital
The Portland District Hospital
The Prince Albert Memorial Hospital (Tenterfield)
The Queanbeyan District Hospital
The Queen Victoria Memorial Hospitals
The Quirindi District Hospital
The Royal Newcastle Hospital
The Rylstone District Hospital
The Scott Memorial Hospital (Scone)
The Shoal haven District Memorial Hospital
The Singleton District Hospital
The Tamworth Base Hospital
The Temora and District Hospital
The Tibooburra District Hospital
The Tingha District Hospital
The Tocumwal Hospital
The Tottenham Hospital
The Trangie Hospital
The Tullamore District Hospital
The Tumbarumba District Hospital
The Tumut and District Hospital
The Tweed District Hospital
The Urbenville and District Hospital
The Ungarie District Hospital
The Vegetable Creek Hospital
The Wagga Wagga Base Hospital
The Walcha District Hospital
The Wallsend District Hospital
The Walgett District Hospital
The Warialda District Hospital
The Warren District Hospital
The Wauchope District Memorial Hospital
The Wee Waa District Hospital
The Wellington District Hospital
The Wentworth District Hospital
The Werris Creek District Hospital
The Wilcannia and District Hospital
The Wilson Memorial Hospital (Murrurundi)
The Wingham and District War Memorial Hospital
The Wollongong Hospital
The Wyalong and District Hospital
The Yass District Hospital
The Yeoval Hospital
The Young District Hospital
The Royal Prince Alfred Hospital
The Royal Alexandra Hospital for Children
Chatswood District Community Hospital
Public Transport Commission of New South Wales
New South Wales Ambulance Board
Zoological Parks Board of New South Wales
Health Commission of New South Wales
Dairy Industry of New South Wales
Sydney Cove Redevelopment Authority
New South Wales Planning and Environment Commission
Metropolitan Waste Disposal Authority (Waste Recycling and Processing Service of NSW)
Totalizer Agency Board of New South Wales
New South Wales Retirement Board
Transport Retirement Board
New South Wales Fish Marketing Authority
Greyhound Racing Control Board
New South Wales Film Corporation
New South Wales Hospitals Planning Advisory Centre
Trotting Authority of New South Wales
Westmead Centre of the Parramatta Hospitals
Sydney Farm Produce Authority Market
Public Authorities Superannuation Board (State Authorities Superannuation Board)
Independent Commission Against Corruption
Judicial Commission of New South Wales
ACT Electricity and Water Authority
Community Welfare Corporation
Home Care Service of New South Wales
New South Wales Lotteries
Government Pricing Tribunal of New South Wales

Services for former electricity distributors recognised for extended leave purposes

Broken Hill Electricity
Central West Electricity
Illawarra Electricity
Monaro Electricity
Murray River Electricity
Murrumbidgee Electricity
Namoi Valley Electricity
New England Electricity
North West Electricity
Northern Riverina Electricity
Northern Rivers Electricity
NorthPower
Ophir Electricity
P-CCC Electricity
Prospect Electricity
Shortland Electricity
South West Slopes Electricity
Southern Mitchell Electricity
Southern Riverina Electricity
Southern Tablelands Electricity
Tumut River Electricity
Ulan Electricity
Western Power

Organisations recognised for extended leave purposes under the State-Owned Corporations Act

Energy South
Far West Energy
First State Power
Macquarie Generation
MetNorth Energy
MetSouth Energy
MidState Energy
NorthPower

Company Procedure

GOVERNANCE			
	Document No	:	GV000-P0013
	Amendment No	:	0
	Approved By	:	CEO
	Approval Date	:	21 October 2013
	Review Date	:	21 October 2014

GV000-P0013 LEGISLATIVE REGISTER

1.0 PURPOSE

To facilitate the review of policies, procedures, workplace instructions and work practices in view of the legislative requirements applicable to the Company's operations.

2.0 SCOPE

The Company is required to comply with state and federal legislation applicable to its operations. The Legislative Register is not meant to be an exhaustive list of all the Company's legal obligations arising under legislation, regulations, rules, industry codes, ministerial directions or departmental memoranda. The scope of this procedure is the provision, maintenance and review of a Legislative Register. This procedure applies to all employees.

3.0 REFERENCES

Internal
Board Policy (Governance) – Governance

External
www.comlaw.gov.au
www.legislation.nsw.gov.au

4.0 DEFINITIONS

Ausgrid's Executive Leadership Team (ELT)
Chief Operating Officer, General Manager Health, Safety & Environment, General Manager People & Services, Chief Engineer, General Manager Network Development, General Manager Network Operations, General Manager Finance & Compliance and General Manager Information, Communication & Technology.

Compliance Manager
The employee holding the position of Compliance and Policy Manager in the Finance & Compliance Division.

Divisional Compliance Representative
The representative nominated by the Ausgrid Leadership Team member that co-ordinates compliance related initiatives and reporting within each division.

Legislative Register
A register of legislation, as set out in Annexure A.

Relevant Manager(s)
The position holder as listed in the Legislative Register.

Review date
The review date displayed in the header of the document is the future date for review of a document. The default period is three years from the date of approval however a review may be mandated at any time where a need is identified due to changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice.

5.0 ACTIONS

The introduction of any repealed or new legislation that affect the Company's operations should be identified by the Relevant Managers responsible for the operations or functions that are impacted by the change.

5.1 Notification of legislation

Information about any repealed or new legislation must be provided to the relevant Divisional Compliance Representative by the Relevant Manager(s) as soon as possible after it becomes known. This information must contain those details needed to amend all the relevant parts of the Legislative Register.

The relevant Divisional Compliance Representative must notify the General Counsel, in writing, of the proposed amendment to the Legislative Register. Within 30 days of receiving this proposal the General Counsel will either confirm with the Divisional Compliance Representative that the amendment will be made to the Legislative Register or provide reasons explaining why the Legislative Register does not require amendment.

Upon receiving this confirmation from the General Counsel, the Divisional Compliance Representative will notify all of the Relevant Managers of the amendment to be made to the Legislative Register.

5.2 Review of legislative register

During May each year, the Compliance Manager will distribute the Legislative Register to the Divisional Compliance Representatives for review within the respective divisions. Each Divisional Compliance Representative must either confirm the accuracy and completeness of the Legislative Register (as it relates to their division) or propose amendment(s) to the Legislative Register before the end of June each year.

The Compliance Manager will collate all the responses received from the Divisional Compliance Representatives and deliver these details to the General Counsel before the end of July each year.

The General Counsel will review (and amend where necessary) the Legislative Register, and submit the Legislative Register to the Chief Operating Officer for approval, before the end of September each year. The amended Legislative Register will be submitted to the Ausgrid Leadership team immediately following that approval.

5.3 Identifying and responding to legislative changes

Each Relevant Manager will maintain an awareness of changes in legislation by various means including:

- subscribing to legislative updating services and legal journals;

- registering with the Parliamentary Counsel's Office (NSW) to receive bulletins about legislative changes;
- enrolling to receive updates about legal developments from relevant government departments, regulators, industry groups and legal firms;
- maintaining membership of relevant industry working groups; and
- registering as a member under the Company's corporate membership of the Australasian Compliance Institute.

After becoming aware of a change in legislation the Relevant Manager must co-ordinate a review of the nature and extent of the change. After the review, the Relevant Manager will assess what action should be taken (including the amendment to any existing policies, procedures and workplace instructions) to address the change. The Relevant Manager will consider obtaining legal advice in circumstances where it is appropriate.

In consultation with the Divisional Compliance Representative and the Relevant Manager, the General Counsel will arrange for the provision of legal update bulletins and awareness sessions on areas of the law identified as being both high risk and where there is a need to enhance the legal knowledge of employees.

The General Counsel will, through the annual report process, inform the Board of Directors of changes in legislation affecting the Company.

6.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

Type of Record	Storage Location	Retention Period*

7.0 AUTHORITIES AND RESPONSIBILITIES

Chief Executive Officer has the authority and responsibility for approving this procedure.

ELT has the authority and responsibility for:

- allocating adequate resources, within their division, to achieve compliance with this procedure; and
- nominating Divisional Compliance Representatives.

General Manager Finance & Compliance has the authority and responsibility for allocating adequate resources to maintain compliance with this procedure.

Compliance Manager has the authority and responsibility for:

- distributing, during May each year, the Legislative Register to the Divisional Compliance Representatives for review within the respective divisions; and

- collating, before the end of July each year, the responses (either confirming the accuracy and completeness of the Legislative Register or proposing amendments to it) received from the Divisional Compliance Representatives and delivering these details to the General Counsel.

Divisional Compliance Representatives have the authority and responsibility for:

- notifying the General Counsel, in writing, of any proposed amendment to the Legislative Register;

- communicating with the Relevant Manager(s) with respect to any change to the Legislative Register; and

- confirming to the Compliance Manager, before the end of June each year, the accuracy and completeness of the Legislative Register (as it relates to their division) or proposing amendment(s) to the Legislative Register.

General Counsel has the authority and responsibility for:

- facilitating the provision of advice on the content of the Legislative Register;
- arranging for the provision of legal update bulletins and awareness sessions;
- informing, on an annual basis, the Board of Directors of changes in legislation affecting the Company and
- reviewing (and amending where necessary), before the end of September each year, the Legislative Register.

Relevant Manager(s) have the authority and responsibility for:

- providing information about any repealed or new legislation to the relevant Divisional Compliance Representative;
- maintaining an awareness of changes in legislation and assessing whether any changes to policy and procedure are necessary as a result; and
- amending/implementing policies and procedures as required to facilitate compliance with any new or amended legislation.

8.0 DOCUMENT CONTROL

Content Coordinator **:** General Counsel

Distribution Coordinator **:** GRC Process Coordinator

ANNEXURE A – LEGISLATIVE REGISTER

Note:

1. With the exception of some metering oriented services, the Company's business operations are substantially within the State of NSW.
2. This register only contains principal legislation (and not any regulations made under an Act)

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
1	BR 1 Safety	**Electricity (Consumer Safety) Act 2004 (NSW)**	NSW Fair Trading	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager- Electrical Safety & Authorisations	Compliance, Audit & Investigation Manager
2	BR 1 Safety	**Marine Safety Act 1998 (NSW)**	Roads & Maritime NSW Australian Maritime Safety Authority The WorkCover Authority of New South Wales	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Public Safety Manager	Compliance, Audit & Investigation Manager
3	BR 1 Safety	**Rail Safety National Law (NSW) and the Rail Safety (Adoption of National Law) Act 2012**	Independent Transport Safety Regulator, as the branch office of the Office of the National Rail Safety Regulator	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Compliance, Audit & Investigation Manager	Compliance, Audit & Investigation Manager
4	BR 1 Safety	**Smoke-free Environment Act 2000 (NSW)**	Ministry of Health	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Health and Well Being Manager	Compliance, Audit & Investigation Manager
5	BR 1 Safety	**Work Health and Safety Act 2011 (NSW)** *Note that Codes of Practice are being continually introduced by Safe Work Australia and adopted by WorkCover*	WorkCover Authority of NSW	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Compliance, Audit & Investigation Manager	Compliance, Audit & Investigation Manager
6	BR 1 Safety	**Workers Compensation Act 1987 (NSW)** (s 211 workers compensation self insurance)	WorkCover Authority of NSW	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Workers Compensation Manager Operational Safety Manager	Compliance, Audit & Investigation Manager
7	BR 1 Safety	**Workplace Injury Management and Workers Compensation Act 1998 (NSW)**	WorkCover Authority of NSW	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Workers Compensation Manager Compliance, Audit & Investigation Manager	Compliance, Audit & Investigation Manager

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
8	BR 2 Network	**Access to Neighbouring Land Act 2000 (NSW)**	Department of Finance & Services	General Manager Network Operations	Manager – Operational Performance	Network Operations Manager(s)	Manager – Operational Performance
9	BR 2 Network	**Apprenticeship and Traineeship Act 2001 (NSW)**	Board of Vocational Education and Training	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Technical Training/ Recruitment Manager	Manager Technical Training
10	BR 2 Network	**Building and Construction Industry Security of Payment Act 1999 (NSW)**	NSW Procurement	General Manager Network Development	Program Director - Major Projects	Program Directors	Program Director - Major Projects
11	BR 2 Network	**Building and Construction Industry Long Service Payments Act 1986 (NSW)** (*imposes a levy on building work)*	Treasury	General Manager Network Development	Program Director - Major Projects	Program Directors	Program Director - Major Projects
12	BR 2 Network	**Electricity Industry Act 2000 (Vic)** (*responsibility for compliance with metering services obligations*)	Department of Primary Industries (VIC)	General Manager, Finance & Compliance	Manager Governance, Risk & Compliance	Executive Manager Data and Technical Services/Manager Network Technology Strategy	Executive Manager Data and Technical Services
13	BR 2 Network	**Electricity Supply Act 1995 (NSW)** (*responsibility for compliance with obligations imposed on distribution network service providers and metering providers*)	IPART (NSW)	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Asset & Network Planning	Manager – Asset & Network Planning
14	BR 6 Environment	**Environmental Planning & Assessment Act 1979 (NSW)**	Department of Planning and Infrastructure	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
15	BR 2 Network	**Essential Services Act 1988 (NSW)**	Department of Premier & Cabinet	General Manager Network Operations	Manager – Operational Performance	Network Operations Manager(s)	Manager – Operational Performance
16	BR 2 Network	**Fair Trading Act 1987 (NSW)** (*in relation to electrical contractors*)	NSW Fair Trading	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Electrical Safety & Authorisations	Manager – Electrical Safety & Authorisations
17	BR 2 Network	**Government Telecommunications Act 1991 (NSW)**	NSW Government Telecommunications Authority (TELCO)	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Secondary Systems	Manager – Secondary Systems

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
18	BR 2 Network	**Home Building Act 1989 (NSW)** (*regulates 'residential building work' and 'specialist work' which includes electrical wiring* work)	NSW Fair Trading	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Asset & Network Planning	Manager – Asset & Network Planning
19	BR 2 Network	**Independent Contractors Act 2006 (Cth)** (*sets up a national unfair contracts scheme for independent contractors who may ask the Court to set aside a contract if it is harsh or unfair*)	Department of Innovation, Industry, Science & Research	General Manager Development (including interface with Network Operations)	Program Director - Major Projects	Program Directors	Program Director - Major Projects
20	BR 2 Network	**Land and Environment Court Act 1979 (NSW)** (*esp part 3, Jurisdiction of the Court and Class 3 relating to land tenure, rating and compensation matters*)	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager – Property & Fleet	
21	BR 2 Network	**National Energy Retail Law (Adoption) Act 2012)** (*For the NECF legislative package, the National Energy Retail Law and National Energy Retail Rules are applied with changes and additions as a law of NSW from 1 July 2013)(these regulate the relationship between distributors and customers and connection and disconnection arrangements)*	Department of Trade & Investment Regional Infrastructure & Services	General Manager Finance & Compliance	Manager- Network Regulatory Compliance	Manager – Network Regulation	Manager- Network Regulatory Compliance
22	BR 2 Network	**National Measurement Act 1960 (Cth)** (*regulates the use of utility meters for trade*)	Department of Innovation, Industry, Science and Research	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Secondary Systems	Manager – Secondary Systems
23	BR 2 Network	**National Vocational Education and Training Regulator Act 2011 (Cth)**	Board of Vocational Education and Training	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Technical Training	Manager Technical Training
24	BR 2 Network	**Radiocommunications Act 1992 (Cth)** (*obligation to license any radiocommunications device*)	Australian Communications and Media Authority	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Secondary Systems	Manager – Secondary Systems
25	BR 2 Network	**Roads Act 1993 (NSW)**	Roads & Maritime NSW	General Manager Network Operations	Manager – Operational Performance	Network Operations Manager(s)	Manager – Operational Performance
26	BR 2 Network	**Rural Fires Act 1997 (NSW)**	NSW Rural Fire Service	General Manager Network Operations	Manager – Operational Performance	Network Operations Manager(s)	Manager – Operational Performance

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
27	BR 2 Network	**State Emergency and Rescue Management Act 1989 (NSW)**	Department of Attorney General & Justice	General Manager Network Operations	Manager – Operational Performance	Network Operations Manager(s)	Manager – Operational Performance
28	BR 2 Network	**Telecommunications (Interception and Access) Act 1979 (Cth)**	Department of Attorney General & Justice	General Manager Information, Communication & Technology	Divisional Governance Risk and Compliance Representative	Executive Manager - ICT Strategy and Architecture	Executive Manager - ICT Strategy and Architecture
29	BR 2 Network	**Telecommunications Act 1997 (Cth)**	Department of Broadband, Communications and the Digital Economy	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Secondary Systems	Manager – Secondary Systems
30	BR 2 Network	**Utilities Act 2000 (ACT)** (*responsibility for compliance with metering services obligations*)	Justice and Community Safety Directorate	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Executive Manager Data and Technology Services/ Manager Metering Information	Executive Manager Data and Technology Services
31	BR 3 Financial	**A New Tax System (Goods and Services Tax) Act 1999 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
32	BR 3 Financial	**Bankruptcy Act 1966 (Cth)**	Department of Attorney General & Justice Insolvency and Trustee Service Australia	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Manager Finance Transactions & Services
33	BR 3 Financial	**Corporations Act 2001 (Cth)** (*in relation to Part 5.4 winding up in insolvency provisions*)	ASIC	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Manager Finance Transactions & Services
34	BR 3 Financial	**Duties Act 1997 (NSW)**	Office of State Revenue	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
35	BR 3 Financial	**Energy and Utilities Administration Act 1987 (NSW)**	Department of Resources and Energy	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Network Regulation	Manager Network Regulation
36	BR 3 Financial	**Fringe Benefits Tax Act 1986 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
37	BR 3 Financial	**Fringe Benefits Tax Assessment Act 1986 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
38	BR 3 Financial	**Fuel Tax Act 2006 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
39	BR 4 Compliance	**Health Records and Information Privacy Act 2002 (NSW)** (*collecting, holding or using health information*)	Ministry of Health	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Workers Compensation Manager/Injury Management Advisor/ Manager HR Operations/Executive Manager Customer Services	Manager Governance Risk & Compliance
40	BR 3 Financial	**Income Tax Act 1986 (Cth)**	The Treasury Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
41	BR 3 Financial	**Income Tax Assessment Act 1936 (Cth) & Income Tax Assessment Act 1997 (Cth)**	The Treasury Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
42	BR 3 Financial	**Independent Pricing and Regulatory Tribunal Act 1992 (NSW)**	IPART	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Network Regulation	Manager Network Regulation
43	BR 3 Financial	**Insurance Act 1973 (Cth)**	Treasury	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Governance, Risk & Compliance	Corporate Insurance Manager
44	BR 3 Financial	**Insurance Contractors Act 1984 (Cth)**	Treasury	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Governance, Risk & Compliance	Corporate Insurance Manager
45	BR 3 Financial	**National Electricity (New South Wales) Act 1997 (NSW)** (*applied the National Electricity Law (as set out in the Schedule to the National Electricity (South Australia) Act 1996) and the National Electricity Rules (as published by AEMC). The Rules are relevant to Ausgrid as a network operator as regards connection of customers Chapter 5 and 5A and economic regulation of its network Chapter 6)*	Department of Resources and Energy	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Network Regulation	Manager Network Regulation

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
46	BR 3 Financial	**Payroll Tax Act 2007 (NSW)**	Office of State Revenue	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
47	BR 3 Financial	**Public Authorities (Financial Arrangements) Act 1987 (NSW)**	The Treasury Audit Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Treasury Manager	Treasury Manager
48	BR 3 Financial	**Public Finance and Audit Act 1983 (NSW)**	The Treasury Audit Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller	Financial Controller
49	BR 3 Financial	**Superannuation Contributions Tax (Assessment and Collection) Act 1997 (Cth)**	The Treasury Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
50	BR 3 Financial	**Superannuation Contributions Tax Imposition Act 1997 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
51	BR 3 Financial	**Superannuation Guarantee (Administration) Act 1992 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
52	BR 3 Financial	**Superannuation Guarantee Charge Act 1992 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
53	BR 3 Financial	**Superannuation Industry (Supervision) Act 1993 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
54	BR 3 Financial	**Taxation Administration Act 1953 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager
55	BR 3 Financial	**Taxation Administration Act 1996 (NSW)**	Office of State Revenue	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller/Taxation Manager	Taxation Manager
56	BR 3 Financial	**Termination Payments Tax (Assessment and Collection) Act 1997 (Cth)**	Australian Taxation Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Finance Transactions & Services	Payroll Manager

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
57	BR2 Network	**Competition and Consumer Act 2010 (Cth)** (*Management of network assets - responsibility for the processes around access to electricity infrastructure, the transport of electricity and the review of regulatory decisions concerning the electricity distribution network and the liability for defects in the supply of electricity under Part 3-5 of Schedule 2*)	Australian Competition and Consumer Commission	Chief Engineer	Divisional Governance Risk and Compliance Representative	Manager – Asset & Network Planning	Manager – Asset & Network Planning
58	BR 4 Compliance	**Competition and Consumer Act 2010 (Cth)** (*Procurement of goods & services from suppliers - responsibility for the processes around Part IV and Part 2-2 of Schedule 2 and Part V - including complying with prohibitions against price fixing, boycotts, resale price maintenance, third line forcing, market sharing, collusion and refraining from anti-competitive arrangements and obligations to act fairly towards suppliers with respect to purchasing and to avoid misleading or deceptive conduct and unconscionable conduct*)	Australian Competition and Consumer Commission	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Procurement & Logistics	Manager Governance Risk & Compliance
59	BR 3 Finance	**Energy Services Corporations Act 1995 (NSW)** (*Responsibility for financial operations - Part 3, section 15 in Part 4, clause 4 in Schedule 2, all of Schedule 3 and all of Schedule 5*)	Department of Trade & Investment Regional Infrastructure & Services	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller	Financial Controller
60	BR 4 Compliance	**Energy Services Corporations Act 1995 (NSW)** (*Responsibility for governance - Part 4 but excepting section 15 and Schedule 2 but excepting clause 4*)	Department of Trade & Investment Regional Infrastructure & Services	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Governance Risk & Compliance/ Compliance Manager	Manager Governance Risk & Compliance
61	BR 4 Compliance	**Government Information (Public Access) Act 2009 (NSW)**	Information & Privacy Commission	General Manager nominated as the Company's Right to Information Officer	Manager Governance, Risk & Compliance	Manager Procurement & Logistics/ Manager Governance & Compliance /Compliance Manager/ Manager Corporate & Government Affairs	The Company's GIPA Coordinator under instructions of the relevant General Manager
62	BR 4 Compliance	**Independent Commission Against Corruption Act 1988 (NSW)**	Independent Commission Against Corruption	Chief Operating Officer	Manager Disclosures Group	Manager Disclosures, Group	Manager Disclosures
63	BR 4 Compliance	**Ombudsman Act 1974 (NSW)**	NSW Ombudsman's Office	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager CIC/Manager Customer Service/Manager Customer Service Operations/Manager Customer Care/Manager Revenue Services/Network Credit Manager/ Credit Services Manager	Manager Governance, Risk & Compliance

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
64	BR 4 Compliance	**Privacy Act 1988 (Cth)** (*processes for maintaining privacy in relation to customer records*)	Department of Attorney General and Justice	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager CIC/Manager Customer Service/Manager Customer Service Operations/Manager Customer Care/Manager Revenue Services/Network Credit Manager/ Credit Services Manager	Manager Governance, Risk & Compliance
65	BR 4 Compliance	**Privacy Act 1988 (Cth)** (*processes for maintaining privacy in relation to employee records - for example personal contact details and tax file numbers*)	Information and Privacy Commissioner	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations/ Manager Security	Manager Governance Risk & Compliance
66	BR 4 Compliance	**Public Interest Disclosures Act 1994 (NSW)**	NSW Ombudsman's Office	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Disclosures, Group/Manager HR Operations/Executive Manager Workforce Relations /Manager Procurement & Logistics	Manager Disclosures
67	BR 3 Finance	**State Owned Corporations Act 1989 (NSW)** (*responsibility for financial operations - except Part 3 Divisions 1, 2 & 3 but including sections 20S-20V and except Schedules 5-10*)	Department of Premier & Cabinet	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Financial Controller	Financial Controller
68	BR 4 Compliance	**State Owned Corporations Act 1989 (NSW)** (*responsibility for governance - Only Part 3 Divisions 1, 2 & 3 but excepting sections 20S-20V and only Schedules 5-10*)	Department of Premier & Cabinet	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Governance, Risk & Compliance / Compliance Manager	Manager Governance, Risk & Compliance
69	BR 4 Compliance	**State Records Act 1998 (NSW)**	State Records Authority	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Corporate & Government Affairs/Manager Governance, Risk and Compliance/Information Support Manager/General Manager Information Communication & Technology *nominee*	Manager Governance, Risk and Compliance
70	BR 4 Compliance	**Workplace Surveillance Act 2005 (NSW)** (*compliance with computer surveillance obligations*)	Department of Attorney General & Justice Privacy Commissioner	General Manager Information, Communication & Technology	Divisional Governance Risk and Compliance Representative	Executive Manager - ICT Strategy and Architecture	Executive Manager - ICT Strategy and Architecture

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
71	BR 4 Compliance	**Workplace Surveillance Act 2005 (NSW)** (*compliance with obligations relating to camera surveillance and tracking surveillance*)	Department of Attorney General & Justice Privacy Commissioner	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/ Manager Security	Manager Property & Fleet
72	BR 5 Reputation	**Annual Reports (Statutory Bodies) Act 1984 (NSW)**	The Treasury	General Manager People & Services	Manager Audit	Internal Communications	Executive Manager - Corporate Communications
73	BR 5 Reputation	**Community Relations Commission and Principles of Multiculturalism Act 2000 (NSW)**	Community Relations Commissioner/Department of Premier & Cabinet	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Government Relations Officer	Executive Manager - Corporate Communications
74	BR 5 Reputation	**Crimes Act 1900 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations /Executive Audit Manager/Manager Security	Executive Manager - Corporate Communications
75	BR 5 Reputation	**Defamation Act 2005 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Executive Manager - Corporate Communications	Executive Manager - Corporate Communications
76	BR 6 Environment	**Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)**	Department of Sustainability, Environment, Water, Population and Communities	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
77	BR 6 Environment	**Aboriginal Land Rights Act 1983 (NSW)**	NSW Office of Communities - Aboriginal Affairs	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager - Property Portfolio Manager	Manager Environmental Services
78	BR 6 Environment	**Australian Radiation Protection and Nuclear Safety Act 1998**	Australian Radiation Protection and Nuclear Safety Agency	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
79	BR 6 Environment	**Building Energy Efficiency Disclosure Act 2010 (Cth)**	Department of Climate Change and Energy Efficiency	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property & Fleet	Manager Property & Fleet
80	BR 6 Environment	**Coastal Protection Act 1979 (NSW)**	Office of Environment and Heritage	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
81	BR 6 Environment	**Community Land Development Act 1989 (NSW)**	NSW Fair Trading	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio	

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
82	BR 6 Environment	**Community Land Management Act 1989 (NSW)**	Department of Trade & Investment Regional Infrastructure & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio	
83	BR 6 Environment	**Contaminated Land Management Act 1997 (NSW)**	Environmental Protection Authority	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
84	BR 6 Environment	**Conveyancing Act 1919 (NSW)** **Electronic Conveyancing (Adoption of National Law) Act 2012 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio/Manager Network Connections	
85	BR 6 Environment	**Crown Lands Act 1989 (NSW)**	Department of Primary Industries	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio Manager/Manager Network Connections/Manager Environmental Services	Manager Environmental Services
86	BR 1 Safety / BR 6 Environment	**Dangerous Goods (Road and Rail Transport) Act 2008**	Environment Protection Authority	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
87	BR 6 Environment	**Dividing Fences Act 1991**	Department of Trade & Investment Regional Infrastructure & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio Manager/Manager Network Connections	
88	BR 6 Environment	**Electricity Supply Act 1995 (NSW)** (*the Energy Savings Scheme is established under Part 9 of the Electricity Supply Act 1995 and Part 9A of the Electricity Supply (General) Regulation 2001*)	Department of Trade & Investment Regional Infrastructure & Services	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager Retail Services	Manager Retail Services
89	BR 6 Environment	**Encroachment of Buildings Act 1922 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio Manager/Manager Network Connections	

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
90	BR 6 Environment	**Environment Protection and Biodiversity Conservation Act 1999 (Cth)**	Department of Sustainability, Environment, Water, Population and Communities	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
91	BR 6 Environment	**Environmentally Hazardous Chemicals Act 1985 (NSW)** (*active Licence No 53*)	Environment Protection Authority	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager – Environmental Services
92	BR 6 Environment	**Fisheries Management Act 1994 (NSW)**	Department of Primary Industries	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
93	BR 6 Environment	**Forestry Act 2012 (NSW)**	Environment Protection Authority	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
94	BR 6 Environment	**Hazardous Waste (Regulation of Exports and Imports) Act 1989 (Cth)**	Environment Protection Authority	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	
95	BR 6 Environment	**Heritage Act 1977 (NSW)**	Office of Environment and Heritage	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/ Manager Property Portfolio/Manager Network Connections/ Manager Environmental Services	Manager Environmental Services
96	BR 6 Environment	**Hunter Water Act 1991 (NSW)**	Hunter Water Corporation	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	
97	BR 3 Finance	**Land Acquisition (Just Terms Compensation) Act 1991 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/ Manager Property Portfolio/Manager Network Connections/General Manager Finance & Compliance	
98	BR 3 Finance	**Land Tax Act 1956 (NSW)**	Office of State Revenue	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio	Manager Property Portfolio

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
99	BR 3 Finance	**Land Tax Management Act 1956 (NSW)**	Office of State Revenue	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio	Manager Property Portfolio
100	BR 6 Environment	**Local Government Act 1993 (NSW)**	Department of Premier and Cabinet	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio/Manager Network Connections	
101	BR 6 Environment	**Marine Parks Act 1997 (NSW)**	Department of Primary Industries	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
102	BR 6 Environment	**Mine Subsidence Compensation Act 1961 (NSW)**	Department of Resources and Energy	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
103	BR 6 Environment	**National Environment Protection Council (New South Wales) Act 1995 (NSW)**	Environment Protection Authority	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
104	BR 6 Environment	**National Environment Protection Council Act 1994 (Cth)**	Department of Sustainability, Environment, Water, Population and Communities	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
105	BR 6 Environment	**National Environment Protection Measures (Implementation) Act 1998 (Cth)**	Department of Sustainability, Environment, Water, Population and Communities	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
106	BR 6 Environment	**National Greenhouse and Energy Reporting Act 2007 (Cth)**	Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services / Environmental & Regulatory Manager	Manager Environmental Services / Environmental & Regulatory Manager
107	BR 6 Environment	**National Parks and Wildlife Act 1974 (NSW)**	Office of Environment and Heritage	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
108	BR 6 Environment	**Native Title (New South Wales) Act 1994 (NSW)**	Department of Attorney General and Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/ Manager Property Portfolio/Manager Network Connections /Manager Environmental Services	Manager Environmental Services
109	BR 6 Environment	**Native Vegetation Act 2003 (NSW)**	Office of Environment and Heritage	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services /Program Director Maintenance/Vegetation Control Manager/Manager Strategic Asset Management	Manager Environmental Services
110	BR 6 Environment	**Natural Resources Commission Act 2003 (NSW)**	Office of Environment and Heritage	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio/Manager Network Connections	
111	BR 6 Environment	**Noxious Weeds Act 1993 (NSW)**	Department of Primary Industries	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services/General Manager Network Development/ Program Director Maintenance/Vegetation Control Manager/Manager Strategic Asset Management	Manager Environmental Services
112	BR 6 Environment	**Ozone Protection Act 1989 (NSW)**	Environment Protection Authority (Office of Environment and Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services / Manager Strategic Asset Management	Manager Environmental Services
113	BR 6 Environment	**Pesticides Act 1999 (NSW)**	Environment Protection Authority (Office of Environment and Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
114	BR 6 Environment	**Plant Diseases Act 1924 (NSW)**	Department of Primary Industries	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services/ General Manager Network Development/ Program Director Maintenance/Vegetation Control Manager/Manager Strategic Asset Management	Manager Environmental Services

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
115	BR 6 Environment	**Property, Stock and Business Agents Act 2002 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/Manager Property Portfolio/Manager Network Connections	
116	BR 6 Environment	**Protection of the Environment Administration Act 1991 (NSW)**	Environment Protection Authority (Office of Environment and Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
117	BR 6 Environment	**Protection of the Environment Operations Act 1997 (NSW)**	Environment Protection Authority (Office of Environment and Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
118	BR 6 Environment	**Radiation Control Act 1990 (NSW)**	Environment Protection Authority (Office of Environment and Heritage)	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
119	BR 6 Environment	**Real Property Act 1900 (NSW)**	Land and Property Information	General Manager People & Services	Divisional Governance Risk and Compliance Representative	General Manager Network Operations *nominee*/ Manager Property Portfolio/Manager Network Connections	
120	BR 6 Environment	**Renewable Energy (Electricity) Act 2000 (Cth)** (*the legislation, and accompanying regulations, under which the RET scheme is administered*)	Office of the Renewable Energy Regulator	General Manager Finance & Compliance	Manager Governance, Risk & Compliance	Manager – Climate Change & Environmental Products/Settlements Officer/Management Accountant/Business Reporting Manager	Manager – Climate Change & Environmental Products
121	BR 6 Environment	**Retail Leases Act 1994 (NSW)** (*applies in relation to the cafeteria licence on level 4 HOB, the retail shops on the ground floor of HOB and the retail shop lease for the café at RCH*)	Office of the NSW Small Business Commissioner	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property & Fleet	Manager Property & Fleet
122	BR 6 Environment	**Road Transport (Vehicle Registration) Act 1997 (NSW)**	Roads & Maritime NSW	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Fleet Manager	Manager Property & Fleet
123	BR 4 Compliance	**Security Industry Act 1997 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Security	Manager Property & Fleet

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
124	BR 6 Environment	**Soil Conservation Act 1938 (NSW)**	Department of Primary Industries (Office of Environment & Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
125	BR 4 Compliance	**Surveillance Devices Act 2007 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Security	Manager Property & Fleet
126	BR 6 Environment	**Sydney Water Catchment Management Act 1998**	Sydney Water Authority	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
127	BR 6 Environment	**Threatened Species Conservation Act 1995 (NSW)**	Office of Environment & Heritage	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services / General Manager Network Development/Program Director Maintenance/Vegetation Control Manager/Manager Strategic Asset Management	Manager Environmental Services
128	BR 6 Environment	**Valuation of Land Act 1916 (NSW)**	Land and Property Information	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio	Manager Property & Fleet
129	BR 6 Environment	**Valuers Act 2003 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Property Portfolio	Manager Property & Fleet
130	BR 6 Environment	**Waste Avoidance and Resource Recovery Act 2001 (NSW)**	Environment Protection Authority (Office of Environment & Heritage)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	General Manager Network Development *nominee*/Regional Managers/ Manager Environmental Services/Manager Strategic Asset Management	Manager Environmental Services
131	BR 6 Environment	**Water Act 1912 (NSW)**	Department of Primary Industries	General Manager Healthy, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
132	BR 6 Environment	**Water Management Act 2000 (NSW)**	Department of Primary Industries (Office of Water)	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services	Manager Environmental Services
133	BR 6 Environment	**Wilderness Act 1987 (NSW)**	Office of Environment & Heritage	General Manager Health, Safety & Environment	Divisional Governance Risk and Compliance Representative	Manager Environmental Services/ General Manager Network Development/ Program Director Maintenance/Vegetation Control Manager/Manager Strategic Asset Management	Manager Environmental Services
134	BR 7 People	**Age Discrimination Act 2004 (Cth)**	Australian Human Rights Commission	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
135	BR 7 People	**Annual Holidays Act 1944 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager HR Operations
136	BR 7 People	**Anti-Discrimination Act 1977 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
137	BR 7 People	**Australian Human Rights Commission Act 1986 (Cth)**	Australian Human Rights Commission	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
138	BR 7 People	**Criminal Records Act 1991 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager HR Operations
139	BR 7 People	**Disability Discrimination Act 1992 (Cth)**	Australian Human Rights Commission	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
140	BR 7 People	**Employees Liability Act 1991 (NSW)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/ Manager Employee Relations	Manager Employee Relations
141	BR 7 People	**Equal Opportunity for Women in the Workplace Act 1999 (Cth)**	Department of Families, Housing, Community Services and Indigenous Affairs	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Executive Manager Learning & Development	Manager Employee Relations

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
142	BR 7 People	**Fair Work Act 2009 (Cth)**	Fair Work Australia	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
143	BR 7 People	**Industrial Relations (Child Employment) Act 2006 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
144	BR 7 People	**Industrial Relations Act 1996 (NSW)** (*Some limited application if Ausgrid engages Owner Drivers to conduct any work. Also s127 may apply to contracts with suppliers.)*	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
145	BR 7 People	**Jury Act 1977 (NSW)** (*only as to section 69 - Employer taking prejudicial action against an employee for being a juror*)	Attorney General (NSW)	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager Employee Relations	Manager Employee Relations
146	BR 7 People	**Long Service Leave Act 1955 (NSW)**	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager HR Operations
147	BR 7 People	**Paid Parental Leave Act 2010 (Cth)**	The Department of Families, Housing, Community Services and Indigenous Affairs	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
148	BR 7 People	**Public Sector Employment and Management Act 2002 (NSW)** (*some application to persons, although not employed by the public sector, who are exercising public functions – including those employed by State Owned Corporations*)	Department of Finance & Services	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
149	BR 7 People	**Racial Discrimination Act 1975 (Cth)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
150	BR 7 People	**Sex Discrimination Act 1984 (Cth)**	Department of Attorney General & Justice	General Manager People & Services	Divisional Governance Risk and Compliance Representative	Manager HR Operations/Manager Employee Relations	Manager Employee Relations
151	BR 9 ICT	**Electronic Transactions Act 1999 (Cth)**	Department of Attorney General & Justice	General Manager Information, Communication & Technology	Divisional Governance Risk and Compliance Representative	Executive Manager - ICT Strategy and Architecture	Executive Manager - ICT Strategy and Architecture

#	Related Business Risk Category	Title of Legislation	Government Department/External Authority	Compliance Owner	Divisional Compliance Representative	Relevant Manager(s)	Contacts with External Authorities
152	BR 9 ICT	**Electronic Transactions Act 2000 (NSW)**	Department of Attorney General & Justice	General Manager Information, Communication & Technology	Divisional Governance Risk and Compliance Representative	Executive Manager - ICT Strategy and Architecture	Executive Manager - ICT Strategy and Architecture
153	BR 9 ICT	**Evidence Act 1995 (NSW)** (*only as to the potential documentation of electronic communications that may be required by a Court in the course of determining a claim*)	Department of Attorney General & Justice	General Manager Information, Communication & Technology	Divisional Governance Risk and Compliance Representative	Executive Manager - ICT Strategy and Architecture	Executive Manager - ICT Strategy and Architecture

Accessing legislation

Access to these pieces of legislation can be made via the hyperlinks included in the references at Section 3 of this procedure.

Environmental Management Strategy

Heritage Asset Management Strategy (HAMS)

EMS 230

Version 3.0

28 Jun 2013

Document control

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1.0	January 2006 - New issue	FuturePast
2.0	May 2007 - Major review of the heritage register	Scott Tinsley
3.0	June 2013 - Rebrand, minor updates, moved actions to EMShare	Scott Tinsley

Disclaimer

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Contents

Executive summary

Ausgrid is committed to the community, safety and meeting the needs of a growing energy market by effectively maintaining assets and finding better ways to plan for future energy demands.

Ausgrid owns and manages 196 heritage listed assets, almost all of which are operational distribution and zone substations. All these items are listed in Ausgrid's Section 170 Heritage and Conservation Register. Twelve of the sites are also listed on the State Heritage Register and 46 items of these assets also listed on an environmental planning instrument by local government (23%).

The management of heritage assets is an important environmental priority for Ausgrid. As such, Ausgrid prepared a Heritage Asset Management Strategy (HAMS) to assist in the conservation of its assets, in accordance with the requirements of the *Heritage Act 1977* and the *State Agency Heritage Guide – Management of Heritage Assets by NSW Government Agencies (*Heritage Council of NSW, 2004).

Key measures of this HAMS include a commitment to:

- establish and maintain registers for Ausgrid's heritage buildings and equipment
- establish and implement a HAMS to adopt best practice heritage management practices, including maintenance of heritage buildings and equipment
- integrate heritage asset management comprehensively within Ausgrid's overall asset management and budgetary considerations
- consult with the Heritage Council of NSW when required
- maintain environmental guidelines (EG 260, EG 261, NEG SM11) outlining the key conservation requirements for staff
- induct, train and provide communications to staff to improve awareness
- ensure that its heritage portfolio is appropriately managed, with reuse opportunities compatible with their heritage values and Government and community expectations
- ensure management of properties is integrated with risk management assessments
- provide adequate resourcing (staffing, expertise and financial) to effectively manage the portfolio
- establish and maintain an Ausgrid Heritage Steering Committee to drive initiatives across the company.

Glossary

Term	Meaning
CMP	Conservation management plan
EIA	environmental impact assessment
Environmental GIS	Ausgrid's Environmental Geographic Information System
EMShare	Ausgrid's Microsoft SharePoint site for environmental management, found on the intranet (called The Wire).
ESD	Ecologically sustainable development: is development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
Guide	*State Agency Heritage Guide – Management of Heritage Assets by NSW Government Agencies*, issued by the Heritage Council of NSW (2004).
HAMS	Heritage Asset Management Strategy: prepared by a State agency to document how the principles and guidelines outlined in the Management of Heritage Assets by NSW Government Agencies will be implemented in the management of heritage assets.
Heritage Council	Heritage Council of NSW: an advisory body established under the Heritage Act that includes members of the community, the government, the conservation profession and representatives of organisations such as the National Trust of Australia (NSW).
Heritage significance	Historic, scientific, cultural, social, archaeological, natural or aesthetic significance.
ICOMOS	International Council of Monuments and Sites
Local heritage item	A place, building, work, relic, tree, archaeological site or Aboriginal object that is identified as a heritage item (or by a similar description) in a local or regional environmental plan; or an item of local heritage significance, as defined by the *Heritage Act 1977*, that is the subject of an interim heritage order in force under that Act or is listed as an item of local heritage significance in the State Heritage Inventory under that Act.
PMIS	Ausgrid's Property Management Information System
Register	Ausgrid's Section 170 Heritage and Conservation Register
SHR	State Heritage Register
SOHI	Statement of Heritage Impact
TAM	Total Asset Management

1 About this document

Ausgrid prepared this Heritage Asset Management Strategy (HAMS) to assist in the conservation of its assets, in accordance with the requirements of the *Heritage Act 1977* and the *State Agency Heritage Guide – Management of Heritage Assets by NSW Government Agencies*, issued by the Heritage Council of NSW (2004).

This HAMS provides information on:

1. The current status of Ausgrid's Section 170 Heritage and Conservation Register (the 'register').
2. The range of heritage assets owned or managed by Ausgrid.
3. Ausgrid's strategy to adopt best practice heritage management practices.
4. Ausgrid's commitment to integrate heritage asset management comprehensively within its overall asset management and budgetary considerations.
5. Recognition of the principles of the Australia International Council of Monuments and Sites (ICOMOS) Charter for the Conservation of Places of Cultural Significance 1999 (The Burra Charter), to guide the heritage conservation of its properties.
6. Ausgrid's commitment to manage its heritage items listed on the State Heritage Register, that incorporates the minimum standards outlined in the Heritage Regulation 2012.
7. Ausgrid's commitment to review and, if necessary, amend the register at least annually.
8. Ausgrid's commitment to provide the Heritage Council of NSW not less than 14 days written notice before the removal, transfer of ownership or cease to occupy any items listed on the register.

1.1 Scope

This HAMS outlines the management of issues associated with Ausgrid's heritage listed assets.

This HAMS does not attempt to address typical day-to-day asset maintenance.

1.2 Audience

This HAMS is applicable to all Ausgrid staff and contractors who manage, maintain and use Ausgrid's assets which are heritage listed.

2 Background

2.1 Strategic context

Ausgrid is one of the largest energy suppliers in Australia with 100 years experience and the leader in providing broad-based energy solutions ranging from electricity, to energy management and renewable energy alternatives.

Ausgrid operates an electricity network of around 22,275 square kilometres – distributing electricity to the Sydney, Central Coast and Hunter regions. Ausgrid supplies electricity to over 1.6 million homes and businesses.

Ausgrid is committed to meeting the needs of a growing energy market by effectively maintaining our assets, regularly upgrading our infrastructure and actively working to reduce greenhouse gas emissions to help protect the environment.

Ausgrid's operations include:

- Operating and maintaining the electricity network infrastructure within a defined distribution area.
- Electrical contracting and engineering.
- Emergency restoration of power.
- Connecting customers.
- Local repairs and major capital works.

Note: On 2 March 2011 EnergyAustralia changed its name to Ausgrid, after selling the retail part of its business. The EnergyAustralia brand was retained by the new owners of the company's electricity retail business, TRUenergy. Ausgrid continues to manage the remaining electricity network.

2.2 Legal requirements

2.2.1 Heritage Act 1977

Under the *Heritage Act 1977* ('the Act'), State Government agencies have specific obligations to manage their heritage assets on behalf of the community. These obligations relate to appropriate identification, management and conservation of heritage assets under the ownership or control of the specific State agency.

Under Section 170 of the Act, each government instrumentality is required to establish and maintain a register that details each item of environmental heritage that they own or occupy. This register, also referred to as the 'Section 170 Register', comprises individual inventory entries for each item or place that has been identified to be of heritage significance, and is required to have a thematic history detailing the history and operations of the organisation, and setting a context for the heritage assessment of the assets under its control.

The register is required to be endorsed by the Heritage Council of NSW (Heritage Council) and be reviewed at least annually and amended (if needed). The register must be available for public inspection and this occurs through the NSW Office of Environment and Heritage website (www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx).

Under Section 170A(4)(a), Ausgrid must give the Heritage Council not less than 14 days written notice before Ausgrid:

a) removes any item from its register under section 170, or

b) transfers ownership of any item entered in its register, or

c) ceases to occupy or demolishes any place, building or work entered in its register.

2.2.2 Heritage Regulation 2012

Ausgrid's is required to manage its heritage items listed the State Heritage Register (SHR) in accordance with the minimum standards specified in the Heritage Regulation 2012. For further information on these requirements, refer to section 5.3.3.

2.2.3 Total Asset Management

Heritage assets form part of the whole of NSW government resources to be managed under its Total Asset Management (TAM) Policy. The TAM Policy, introduced to achieve better planning and management of the State's assets.

Effective and efficient management of heritage resources is an integral component of wider asset management requirements. The TAM Manual includes separate guidelines on Heritage Asset Management and on Sustainable Development. The TAM Manual also outlines the recommended heritage asset strategic planning process and recommends the adoption of an agency-wide heritage management policy or strategy.

The Heritage Council has instructed all State Government agencies to identify, assess and record heritage assets through the preparation of a register.

2.2.4 State Agency Heritage Guide

The State Agency Heritage Guide (the 'Guide') are recognised by Ausgrid as an important structure for effective and efficient heritage asset management, and through this HAMS, are adopted.

The Guide includes a suite of Heritage Management Principles issued by the Minister for Planning. Refer to section 5.1 for a summary of the principles, and how Ausgrid demonstrate the current commitment of Ausgrid to heritage management as part of TAM. All heritage assets owned or managed by Ausgrid will continue to be integrated into its TAM program.

3 Ausgrid's heritage assets

3.1 Overview

Ausgrid owns and manages 196 heritage listed assets, almost all of which are operational distribution and zone substations. All of these items are listed in the register.

Twelve of the sites are also listed on the SHR and 46 Ausgrid heritage assets are also listed on an environmental planning instrument by local government (23%).

The substations are located throughout urban and suburban Sydney and Newcastle, within residential, commercial and industrial precincts. The assets range in age from 1904 to c1950 and primarily consist of small brick substation buildings built in a variety of architectural styles.

3.2 Local heritage significance

Ausgrid's 184 items of local heritage significance are operational or decommissioned distribution substations which are designed to service a local area and are generally built to a range of architectural styles or types.

All of these items are listed in our register.

3.3 State heritage significance

Ausgrid’s 12 items of State heritage significance include:

Substation Number 5 "MOUNTAIN STREET"

The Mountain Street substation is a rare and early example of an externally intact substation dating back from the Federation period. It is the oldest substation still in operation within the Ausgrid network.

Substation Number 15 "JOHNSTON STREET"

The Johnston Street substation is an unusual, rare and representative example of a purpose designed structure. Built in the early 20th century, it has an elaborate, well detailed Federation Freestyle facade. The building is of state significance. The building is located within the Annandale Urban conservation Area as listed by the National Trust.

Substation Number 167 “AUBURN” 33KV ZONE

The Auburn Zone substation is a large and attractive structure which features Art Nouveau and Art Deco detailing to the street facade. The structure was the major high voltage electricity distribution point for this part of Sydney when constructed in 1924. It has been upgraded to allow it to continue to serve its original function as a zone substation.

Substation Number 187 "CROWS NEST" 33 kV ZONE

The Crows Nest substation is a rare and representative example of an unusual building design from the Interwar period which features mansard roof, decorative rendered walls with recessed bays and elongated arches to the street facades. It is considered to be of state significance.

Substation Number 195 "PYMBLE" 33 kV ZONE

The Pymble Zone substation/depot is an elegant and refined example of a well detailed face brick substation building designed in the Interwar period. It is considered to be of state significance and a rare and representative example of this style of substation building.

Substation Number 269 “WAVERLEY” 33KV ZONE

The Waverley Zone substation is a substantial externally intact and representative example of an Interwar Mediterranean styled zone substation. As a zone substation, it acts as a key piece of infrastructure for the distribution of electricity to the surrounding area. It was built by the Municipal Council of Sydney during the period of rapid expansion of the electricity network into the suburbs.

Substation Number 341 "RANDWICK" 33 kV ZONE

The Randwick Substation is a rare, substantial, attractive and well detailed building of state significance, being representative of the Interwar Mediterranean style. "Although a major part of the Bunnerong Power Station distribution network, the Sydney Municipal Council was still keen to provide a building worthy of a residential area." (Randwick Heritage Study).

Substation Number 342 "PADDINGTON" 33 kV ZONE

The Paddington Zone substation is a fine rare and representative example of an externally intact interwar Functionalist building located within the Paddington Urban Conservation Area as listed by the National Trust makes a substantial contribution to the character of the streetscape in the Paddington area. It has considerable architectural significance on a state level, as the only known example of its kind in Sydney.

Substation Number 349 “PRINCES STREET”

The Princes Street substation is a rare and unusual, well detailed representative example of a purpose designed and built Interwar Spanish Mission style building. It is of regional significance within the eastern suburbs. It is a fine example of the work of the electricity undertaking of the Sydney Municipal Council, which was conscious of the need to erect substations suitable to the urban environment of the time.

Substation Number 15003 "BALGOWLAH" 33 kV ZONE

The Balgowlah Zone substation is an elegant and refined example of a well detailed face brick substation designed in the Interwar period. It is a rare and representative example of this style and considered to be of state significance.

Substation Number 15009 "MANLY" 33 kV ZONE

The Manly Zone substation is a fine and robust, well detailed face brick purpose designed and built structure. It is an excellent and externally intact representative example of the Interwar Art Deco style. It is considered to be a rare example of this style and of state significance.

St Davids Road Depot (Former Substation No. 1518)

The St Davids Road Depot is a representative example of a substantial and well maintained Interwar stripped Classical purpose designed structure built as part of the infrastructure for the introduction of electricity to the western suburbs of Sydney. It is the largest structure remaining in existence built by the private Electric Light and Power Supply Corporation which supplied power to parts of Sydney's Inner West between 1909 and 1955. It is located within the Haberfield Urban Conservation Areas as listed by the National Trust.

3.4 Movable heritage

Ausgrid also has a Movable Heritage Register which currently lists 183 items of significant electrical switchgear, transformers and other equipment.

In some cases, such equipment is contained within a heritage listed substation. In other cases, the equipment may be significant but the structure may not be significant. When decommissioning substations it is considered preferable to keep listed equipment within a listed building, where possible, in preference to keeping listed equipment in a non-significant building.

4 Review of heritage register

4.1 Past reviews

Ausgrid undertook an extensive review of its register over 2006/7 with the goal of integrating the 1994 Sydney Region and 2002 Hunter/Central Coast Region registers into one electronic database and reviewing the existing listings in accordance with current heritage practice.

As a part of that project, over 320 assets were examined, including 47 new properties not assessed in previous heritage studies.

Upon completion of the review, the final register had 206 listed assets, including 12 items of State heritage significance. The reviewed register was endorsed by the Executive in April 2007 and was submitted to the Heritage Council for endorsement in July 2007.

Since 2007, Ausgrid has continued to regularly review our register, however only minor amendments were required at those times.

4.2 Recent review process

4.2.1 Objectives

The purpose of Ausgrid's recent heritage review was to identify heritage assets in various categories and provide a strategy and ranking for prioritising conservation works to common asset types.

In addition, the following specific objectives are set for the reviews:

- To align company decision-making regarding the retention, refurbishment, decommissioning or disposal of heritage listed assets with ongoing operational need, wise investment of resources and company heritage policy.
- To assist Ausgrid in the long term goal of retaining in service those substations of the highest levels of significance which can continue to meet operational needs into the future.
- To facilitate differential decision-making across a portfolio of assets with a great degree of commonality in significance and operational characteristics.

4.2.2 Criteria

The review assessed each item of heritage significance under set criteria.

The approach and methodology for the 2012 review was to:

- Build on the initial work of the 2006/07 Heritage Register Review.
- Gather additional data for the heritage listed substations regarding the architectural quality, heritage significance, moveable heritage, property and operational constraints.

- Conduct a series of consultation sessions with Ausgrid internal stakeholders including those from the Network, Property and Environmental areas.
- Develop a method for ranking and prioritising substations for conservation.
- Provide recommended conservation priorities for Ausgrid.
- Provide a suggested heritage policy that could form the future corporate direction to aid the management of heritage assets.

The conservation priority for each listing was then determined. The final register has 196 listed assets including the previously listed 12 items of state heritage significance.

The review is summarised in a report called *Ausgrid Section 170 Heritage and Conservation Register Review* (July 2012) and its appendix *Constraints and opportunities sites handbook* (Part 1 and 2).

An example of the constraints and opportunities reviewed for each heritage listed substation is shown in Figure 4-1.

Figure 4-1 Example of the Ausgrid section 170 Review – Sites Handbook

Name	**MOUNTAIN STREET**	Substation Number	**5**
Function	**Network Substation**	Heritage Status	**State**
PMIS	**3182**	LEP Listing	**Y**
Address	**Mountain Street, 41, ULTIMO**	Movable Content	**Y**
LGA	**Sydney**	Architectural Type	**Federation**
DP/Lot	**DP 191928 Lot 1**	Quality	**H**
Zoning	***Zone 10 'Mixed Uses'***	Area (m²)	**127**
			
Constraints • **State Heritage Register listing requires minimum maintenance** • **Building works require application to Heritage Council** • **Contains movable heritage**		Opportunities • **Adjacent to larger Ausgrid property** • **Located in high-value commercial / residential area** • **Building capable of adaptation to varied uses**	
Site has a Conservation Management Plan (2007) Full suite of conservation works and repairs documented in 2012			

4.3 Thematic histories

In addition to the formal reviews, Ausgrid has sponsored the production of three historical works relating to its activities:

Electrifying Sydney: 100 Years of EnergyAustralia by George Wilkenfeld and Peter Spearitt (2004)

In July 2004, Ausgrid celebrated the centenary of electric street lighting in Sydney. A special commemorative book examining the history of electricity in New South Wales has been published, and can be downloaded from Ausgrid's web site.[1] The book highlights the great technological and social changes over the past century to which the growth of the electricity industry has contributed. It also portrays the character and culture of Ausgrid and the events and struggles which have shaped today's successful organisation.

From council to corporation: the history of Newcastle's electricity supply by Peter Armstrong (2002)

Written by a former member of staff, this book examines the history and development of electricity in the Newcastle area, tracking its development from a small, struggling operation to a substantial enterprise providing electricity to Australia's major industrial centre.

Switched on in the Hunter: a history of electricity supply to Newcastle and the Hunter Valley 1889-1996 by Robert Low (2004)

Looking beyond the major urban centres of NSW, this work outlines the development of electricity in the smaller communities and rural areas of the Central Coast. Significantly, it records the oral histories of former employees of the electricity enterprises which serviced these areas.

These three works provide a detailed picture of the history and development of electricity in Ausgrid's area of operations and the social impact electricity has had on Australian society.

[1] www.ausgrid.com.au/Common/About-us/~/media/Files/About%20Us/ElectrifyingSydney100Years.ashx

5 Management strategy

5.1 Management principles

The following management principles have been incorporated into Ausgrid's HAMS.

5.1.1 HAMS

This HAMS demonstrates the commitment of Ausgrid to implement the principles of the Guide, which identifies the following key components of a HAMS:

- A management action plan.
- An asset maintenance plan.
- A redundant assets transfer plan.
- An asset transfer plan.
- A performance and reporting.
- A completion date for a register.

5.1.2 Identification of heritage assets

Since 1994 Ausgrid has been actively involved in identifying heritage assets for listing on its register. During 2006/7, Ausgrid engaged a consultant to review the original 1994 Sydney Electricity Heritage Register and 2002 Hunter and Central Coast Heritage Registers. The reviewed and integrated register which was submitted to the Heritage Council in July 2007, well in advance of the December 2009 deadline.

5.1.3 Lead by example

In preparing this HAMS, developing our register, and through the integration of heritage provisions into asset management processes and practices (as guided by the Heritage Council), Ausgrid will lead the community by example with regard to heritage conservation and management.

5.1.4 Conservation outcomes

Ausgrid is dedicated to high quality conservation outcomes for its heritage assets, in accordance with the Burra Charter; the Act, the Guide and TAM policy, including conserving assets for operational purposes and adaptive reuse of buildings in preference to alteration, demolition or disposal.

5.1.5 Sustainability

By undertaking good conservation practice, Ausgrid is committed to improved sustainability. The retention, ongoing maintenance and repair of historic assets recognise the value of historic fabric and the energy embodied in them. Unjustified demolition, new construction and poor maintenance practice is likely to result in a greater environmental cost in the long term than good conservation practice, and is therefore less sustainable.

Ausgrid's Environmental Impact Assessment (EIA) process ensures that impacts on heritage assets from works are reviewed and mitigation measures implemented. The process also requires a Statement of Heritage Impact (SOHI) where works are impacting on heritage assets.

5.1.6 Integrated heritage management

Through its existing TAM and related property management policies and strategies, Ausgrid integrates management of its heritage assets into existing standard procedures. This HAMS, summarises Ausgrid's asset management approach and demonstrates this integrated approach in accordance with TAM.

Heritage information is now available in Ausgrid's Property Management Information System (PMIS) and Environmental Geographic Information System (GIS).

5.1.7 Appropriate uses

Ausgrid recognises the need for allocating appropriate uses for heritage assets, typically the original use for which the building / space was designed. In recognising changing operational requirements and provision of adequate community facilities, Ausgrid will ensure that where necessary, items are adaptively reused for a purpose sympathetic to their heritage significance.

5.1.8 Maintenance of heritage assets

Ausgrid recognises the need to maintain assets in a manner which retains heritage significance, and prevents deterioration. Ausgrid acknowledges its obligation to meet the Minimum Standards of Maintenance and Repair requirements of the Act. Each of Ausgrid's twelve State significant heritage items is reviewed annually.

In 2013 Ausgrid has undertaken a major heritage restoration of the State heritage listed Substation 15 in Annandale.

5.1.9 Alterations

Ausgrid recognises the need to plan and execute alterations to minimise negative impacts on heritage significance (including curtilage and setting). This includes in the management of its heritage assets and in the provision of new infrastructure throughout its area of operations. Heritage considerations are built into Ausgrid's EIA procedures to ensure issues are identified early and managed appropriately.

5.1.10 Transfer of ownership

By developing a strategic approach to property management generally through this document, and the development of related documents such as a realistic and strategic disposal and renewal plan, Ausgrid has created an opportunity to transfer or dispose of heritage assets in an appropriate manner. The heritage status of any asset to be disposed of is disclosed to prospective purchasers as a part of the disposal process.

5.1.11 Management of redundant heritage assets

By developing a strategic approach to property management generally through this document, and the development of related documents such as a realistic and strategic disposal and renewal plan, Ausgrid has created an opportunity to manage redundant heritage assets in an appropriate manner.

5.1.12 Prudent financial and budgetary management

Ausgrid will implement the five stages of TAM in an efficient and effective manner which achieves value for money and does not unreasonably burden the community into the future.

5.1.13 Staff expertise and compliance

Ausgrid is committed to providing the appropriate expertise for management of its heritage assets. Where in-house and external consultants require additional heritage expertise, they will be provided with specialist training, or seek the engagement of suitable heritage consultants. Local tradesmen are selected based on appropriate experience when working with the agency's important heritage properties.

5.1.14 Monitor performance

Ausgrid proposes to monitor and report on the relevance, effectiveness and efficiency of heritage assets and service delivery, and take prompt action to provide optimal heritage conservation outcomes.

5.1.15 Monitor condition

Ausgrid monitors the reports on the physical condition of heritage assets in the register through cyclic maintenance schedules for the properties it manages directly.

5.1.16 Promotion

Ausgrid will investigate the promotional opportunities of the heritage of its assets. It recognises the identified State heritage significance of all of its assets and the value of those sites to the community.

In July 2004, Ausgrid celebrated the centenary of electric street lighting in Sydney. A special commemorative book examining the history of electricity in New South Wales has been published, and can be downloaded from Ausgrid’s website. The book highlights the great technological and social changes over the past century to which the growth of the electricity industry has contributed. It also portrays the character and culture of today's Ausgrid, and the events and struggles which have shaped today's successful organisation.

5.2 Management action plan

The Heritage Asset Environmental Action Plan includes a staged strategy to achieve the conservation and management of identified Section 170 heritage items. Key tasks are identified, recorded and tracked to completion.

The management of Ausgrid owned or managed properties will be undertaken in accordance with its:

- Legislative requirements under the Act.
- Core functions and service delivery requirements.
- Government policy and procedure (such as TAM requirements).
- Financial and budgetary constraints.

Ausgrid understands that the heritage assets under control of the NSW Government are significant to the history and development of NSW and to the community and will:

- Ensure that its heritage portfolio is appropriately managed, with reuse opportunities compatible with their heritage values and Government and community expectations.
- Ensure management of properties is integrated with risk management assessments.
- Provide adequate resourcing (staffing, expertise and financial) to effectively manage the portfolio.
- Provide adequate training to key staff.
- Integrate heritage management into all corporate systems (such as the Environmental GIS, Asset Management Plan, Corporate Plan, staff induction materials, etc).

5.2.1 Moveable heritage

Ausgrid has identified movable heritage assets to be retained or displayed appropriately in context within key properties. All identified movable heritage assets or collections will be progressively inventoried and the data added to the register. The recording and preservation of movable heritage assets will be undertaken in accordance with the Movable Heritage Guidelines (Heritage Council, 2000).

The management of archival documents and materials should continue to be undertaken within the requirements of State records guidelines and the *State Records Act 1998*.

Ausgrid endeavours to keep movable heritage insitu as this provides a storage location that is maintained and keeps the items in context. However at times some items have been moved for safe storage or display at other locations. For example, at Silverwater learning centre high voltage cubical switchgear and low voltage board are being set up in a display to demonstrate heritage equipment. Some equipment has also been stored at Ausgrid's Somersby warehouse.

5.3 Asset maintenance plan

This asset maintenance plan aims to achieve sound heritage conservation outcomes, while optimising the efficient use of Ausgrid's maintenance funding.

Ausgrid identifies the following critical requirements:

- The need to complete condition based assessments of all heritage assets.
- Ensuring that its State Heritage Listed properties (which includes all Section 170 Register items), are maintained in accordance with the minimum standards specified in the Heritage Regulation 2012.
- Acknowledgement that all works at individual properties are undertaken in accordance with the requirements of the State-Owned Heritage Management Principles and Heritage Asset Management Guidelines.
- That all contractors and tradespeople interacting with its heritage portfolio are appropriately advised of the item's values and key heritage fabric, and that their skills are suitable.
- Sufficient budgetary flexibility to support the maintenance program, and to accommodate urgent breakdown maintenance.

Ausgrid will ensure that the maintenance program will address the following issues where relevant to individual properties or items:

- Breakdown maintenance.
- Preventative maintenance.
- Servicing maintenance.
- Cyclic maintenance.
- Condition-based maintenance.
- Specialist heritage requirements.
- Guidelines for building managers about the protection of heritage significance: on a day-to-day basis and for future owners/occupiers.
- Maintenance plans based on the total asset management process.
- Capital investment plan that includes medium and long-term maintenance plans.
- Annual program to implement the maintenance program.

Maintenance planning following the total asset management process includes:

- Linking the asset to the State agency's service strategies.
- Defining the level of performance required.
- Ensuring the asset is productive at lowest possible long term cost (including conservation of heritage significance of asset).
- Long-term plans (ten years plus) that include conservation of major components; medium-term plans (five to ten years) that define major impending tasks.

5.3.1 Specific maintenance plans

Ausgrid has a number of scheduled maintenance program in place to achieve long-term conservation of our heritage assets:

- **Asbestos Distribution Roof Replacement Program** - A number of Ausgrid's heritage distribution substations have bonded asbestos within the roofs. Replacement of the roof is essential maintenance and repairs are necessary to protect the integrity and heritage value of the buildings. These works are vital to ensure the long term viability of the substations. It is anticipated that 300 substations will require roof replacement over a 5 year period. Some of these are known to be heritage listed.
- **Distribution Security Upgrade Program** - Doors and vents on distribution substations are being upgraded to meet current standards for security and fire rating purposes. These works are vital to ensure the long term viability of the substations as an operational part of the network. Works are sympathetic to the original building materials and have been designed to match the original finish.

Whilst not a specific maintenance plan, Ausgrid has also been assessing heritage distribution substations and making repairs as required. This has included repairing corroded lintels, cracked brickwork and steel windows. Ausgrid will consider developing separate maintenance plans for significant heritage assets, to reflect that a higher the level of an item's significance requires a higher level of maintenance that may be required.

5.3.2 Maintenance and Repair

Ausgrid acknowledges its obligation to meet the Minimum Standards of Maintenance and Repair requirements under Section 118 of the Act (set out in Part 3 of the Heritage Regulation 2012. The Regulation requires regular inspections to be undertaken to ensure that standards are met, and set out standards in relation to weather and fire protection, security and essential maintenance and repair, fire protection and security.

Ausgrid monitors the condition of all its assets and will ensure all State significant assets comply with the minimum standards. Each of Ausgrid's twelve State significant heritage items is reviewed annually for condition and compliance with the minimum standards. Specific maintenance plans will be integrated into Conservation Management Plans (CMP) prepared for State significant assets in future. Ausgrid also endeavours to ensure these standards are met for its items of local heritage significance.

5.4 Redundant assets plan

The following strategy covers the management and conservation of heritage assets with no apparent economic re-use options. Where heritage assets do not meet the service delivery needs of the agency, alternate management options including transfer or lease to other parties are to be thoroughly investigated, particularly prior to any proposal to demolish.

5.4.1 Operating principles

Ausgrid will follow the requirements of NSW Government TAM Policy and Treasury requirements with the identification of properties for disposal. It acknowledges the staged assessment processes identified by the Premier's Memorandum 2003-3 Property Disposal Reforms, and NSW Treasury guidelines. The Asset Disposal Guidelines in the Total Asset Management (TAM) Manual, available at www.gamc.nsw.gov.au, provide guidance in the development of an asset disposal strategy. These include the preparation of a Property Disposal Plan (PDP), considered an integral component of an agency's Total Asset Management strategic planning and budgeting cycle.

Ausgrid will follow the agreed assessment identification stages.

An asset may be identified as surplus when one or more of the following occurs:

- The asset is not required for the delivery of its services, either currently or in the long term.
- The asset has become uneconomical to maintain and/or operate.
- The asset is no longer suitable for ongoing core service delivery needs.

Asset disposal will be dependent on one or more of the following:

- Whether there are net disposal benefits, either in financial or other terms.
- Whether there are secondary service obligations associated with the asset, which may dictate its retention.
- Whether a disposal can be carried out without adverse impacts on the physical environment and heritage values of the item.

Prior to the identification of a suitable body to transfer ownership and control, Ausgrid will maintain the property with regard to the minimum maintenance standards of the Act. There are numerous examples of former Ausgrid assets being successfully reused for residential and commercial purposes.

5.5 Asset transfer plan

Ausgrid will prepare and implement a plan outlining management requirements for any state heritage assets proposed for transfer. The plan will outline measures to achieve the long-term conservation of the heritage asset. The document will address the following issues:

- Assets will have a completed CMP, endorsed by the Heritage Council, prior to a decision to transfer an item.
- The identified heritage significance values of the property or item will guide discussions regarding its transfer to appropriate bodies.
- Transfer will be considered only to those bodies with appropriate resources and shared heritage values.
- The requirement to provide 14-days written notice under Section 170A of the Act, will be actioned.

The identification of redundant heritage assets will be undertaken regularly and meet State Government (TAM) asset disposal and policy guidelines, and the requirements of the Act.

This includes prior 14-day minimum notification to the Heritage Council under Section 170(A) of the Act.

5.6 Performance plan

To monitor performance, this HAMS includes indicators relevant to the heritage asset type and core functions of the agency. Such indicators could address:

- heritage conservation outcomes;
- business outcomes;
- service delivery obligations;
- asset portfolio performance requirements;
- community satisfaction;
- comparison of actual performance against anticipated performance.

Results of monitoring will inform the periodic reviews of the Heritage Asset Management Strategy and budget planning. The Heritage Asset Management Strategy will be made available to the public.

6 Heritage asset environmental management plan

6.1 Management objectives

The objectives of the HAMS fall into these main categories:

1. Identify:

- To establish Heritage Registers as a key tool of heritage management within the organisation.
- To maintain Heritage Council endorsement of our registers.
- To review and update Ausgrid's Heritage Registers.
- To make Ausgrid's register publicly available.

2. Plan:

- To review and update existing policies and plans to align them with the Heritage Principles and Guidelines 2005 and any amended legislative requirements.
- To integrate heritage information into internal systems and processes, including any Asset Maintenance Plan and Redundant Assets Plan.

3. Manage:

- To promote staff awareness by integrating heritage information into company Environmental Induction Program.
- To prepare CMPs for all State Heritage Listed items (unless agreed otherwise with the Heritage Council).
- To establish and maintain a Heritage Steering Committee.

4. Implement:

- To maintain current procedures and systems to ensure they meet all relevant heritage requirements.
- To communicate the existence and use of our Heritage Registers to staff.
- To investigate the need for a specific heritage funding program for maintenance, interpretation and/or promotion.
- To investigate and implement public heritage promotional and educational initiatives.

5. Monitor and report:

- To monitor and report progress against this Heritage Strategy annually.

Actions to achieve these objectives are tracked in EMShare.

6.2 Completed actions

Key achievements include:

- Environmental Guideline (EG 260) developed and published - June 2005
- Submission of Ausgrid's HAMS to the Heritage Council - January 2006
- Endorsement of Heritage Asset Management Strategy by the Heritage Council - February 2006
- Completion of the Heritage Register Maintenance Procedure - April 2007
- Completion of the Heritage and Conservation Register Review and Endorsement by Ausgrid Executive - May 2007
- Revision of the Heritage Asset Management Strategy - May 2007
- Establishment of the Ausgrid Heritage Steering Committee - May 2007
- Submission of the S170 Heritage Register to the Heritage Council - June 2007
- Submission of the Revised Heritage Asset Management Strategy to the Heritage Council - June 2007
- Appointment of a Heritage Adviser - 2007 - 2009
- Template CMP developed - February 2008
- Environmental Guideline (EG 261) completed for the conservation of distribution substations with ‘local’ significance - April 2008
- Environmental Guideline (EG 261) completed for the conservation of distribution substations with ‘local’ significance - April 2008
- Environmental Guideline (EG 260) updated to include movable heritage requirements - July 2009
- Movable Heritage register established - April 2010
- Revision of the S170 Heritage Register - June 2012
- Revision of Heritage Asset Management Strategy - June 2013
- Environmental Guidelines (EG 260/EG 261) - July 2013

7 Roles and responsibilities

7.1 All staff

Ensure impacts from works on Ausgrid's heritage assets are assessed prior to works commencing.

7.2 Environmental Services

Maintain Ausgrid's S170 register and Movable Heritage register.

Provide advice and guidance on management of Ausgrid's heritage assets.

7.3 Property Portfolio

Report to Environmental Services any heritage assets that require disposal.

Maintain Ausgrid's heritage assets that are not substations.

7.4 Substation Building Maintenance

Maintain Ausgrid's heritage substation assets.

7.5 Heritage Steering Committee

Promote responsible management of heritage assets across Ausgrid.

Review issues related to Ausgrid's heritage asset management.

Monitor HAMS actions and track to completion.

7.6 Environmental Steering Committee

Promote responsible environmental management across Ausgrid.

Review issues related to environmental management across Ausgrid.

7.7 Heritage Council of NSW

Place information about Ausgrid's S170 register on the State heritage inventory that is available to the public via the Office of Environment and Heritage website.

8 References

Armstrong P, 2002, *From council to corporation: the history of Newcastle's electricity supply*

Australia International Council of Monuments and Sites (ICOMOS), 1999, *Charter for the Conservation of Places of Cultural Significance* (The Burra Charter)

FuturePast, 2012, *Ausgrid Section 170 Heritage and Conservation Register Review*

Heritage Act 1977

Heritage Council of NSW, 2000, *Movable Heritage Guidelines*

Heritage Council of NSW, 2004, *State Agency Heritage Guide – Management of Heritage Assets by NSW Government Agencies*

Low R, 2004, *Switched on in the Hunter: a history of electricity supply to Newcastle and the Hunter Valley 1889-1996*

State Records Act 1998

Wilkenfeld G and Spearitt P, 2004, *Electrifying Sydney: 100 Years of EnergyAustralia*

9 Related documents

This HAMS refers to the following Ausgrid environmental guidelines:

- EG 260 Non-Aboriginal Heritage guidelines
- EG 261 Heritage Conservation Guidelines for Distribution Substations with 'Local' Heritage Significance
- NEG SM11 Movable Heritage guideline

This HAMS also refers to the following Ausgrid environmental planning documents:

- NUS 174 Environmental Procedures
- NUS 174a EIA Worksheet
- NUS 174b EIA Guidelines
- NUS 174c Environmental Handbook
- EGN 174b EIA Guidance Notes
- EF 17440 Movable Heritage Assessment Checklist

Environmental Management Strategy
Underground Transmission Cables

EMS 300

Version 11.3, 27 August 2014

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Glossary

24/7	24 hours, 7 days a week
AER	Australian Energy Regulator
ANZECC	Australian and New Zealand Environment Conservation Council
CLM Act	Contaminated Land Management Act 1997
DBYD	Dial Before You Dig
DG	Ausgrid's distribution guideline
Emergency works	Works for the purpose of maintaining or restoring infrastructure facilities or equipment in order to ensure public safety or to protect buildings or the environment due to: • a sudden natural event, including a storm, flood, tree fall, bush fire, land slip or coastal inundation, or • accident, equipment failure or structural collapse, or • damage caused by vandalism or arson, provided the works involve no greater disturbance to soil or vegetation than necessary and are carried out in accordance with all applicable requirements of the Blue Book.
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services.
EPA	Environmental Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulations	Environmental Planning and Assessment Regulation 2000
Km	Kilometre
KPA	kilopascals
kV	kilovolts
LAB	Linear Alkylbenzene
OCP	Organochlorine pesticides
OEH	Office of Environment and Heritage
OH&S	occupational health and safety
POEO Act	*Protection of the Environment Operations Act 1997*
RMS	Roads and Maritime Services
SCFF Cable	Self contained fluid filled cable
XLPE	Crosslinked polyethylene

Executive summary

Ausgrid is committed to the community, safety and meeting the needs of a growing energy market by effectively maintaining our assets, (in accordance with the AER submission) and finding better ways to plan for our future energy demands.

Ausgrid has approximately 420kms of cables which are paper insulated fluid filled, also known as self contained fluid filled (SCFF) cables. This represents approximately 4% of Ausgrid's underground network. The function of the cable fluid is to improve performance of the cable by filling voids present in the paper insulation and so avoiding cable breakdown. The cables were installed mainly in the 1950s through to 1970s.

As these cables are buried in the ground they are subject to environmental and mechanical stresses as well as the electrical stresses they experience through normal operation as part of the electricity network. Where these stresses result in damage of the metal sheath containing the insulating fluid it is possible that this fluid can leak into the ground, either from continuous small leaks or infrequent catastrophic leaks, which requires prompt excavation and repair.

The fluid filled cables are in continuous use and are an essential part of Ausgrid's supply network, and therefore cannot routinely be taken out of service except for brief periods necessitated by the need for maintenance and repair.

Minimising the environmental risk associated with the operation, maintenance and repair of fluid filled cables is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures including cable maintenance, repair, reporting, replacement and other improvement projects outlined in this strategy.

Key measures include:

- Use of biodegradable linear alkylbenzene as the replacement fluid for the cables.
- A commitment to use non fluid filled (Cross Link Ply-Ethylene (XLPE)) cables for all new feeders.
- A range of strategies to prevent unauthorised excavation such as Dial Before You Dig, patrols, handouts and seminars.
- Maintenance, monitoring, resourcing and training procedures.
- Internal and external reporting procedures commencing when leak rates reach locatable levels (currently 5L/day).
- A commitment to continue to target fluid losses 30% below the 2009 (which was a 15% reduction on the 2001 level) target.
- A commitment to adopt proven technologies that will improve performance as soon as possible.
- Ausgrid is currently planning for the replacement of fluid filled cables by 2030 (target date, subject to AER approval of appropriate levels of capital funding).
- A commitment to report against, review and update this plan on an annual basis.

1 Scope

This management strategy outlines the management of environmental issues associated with Ausgrid's fluid filled underground transmission cables and associated trenches. It also considers the health, safety and environmental controls applicable during the excavation, restoration, works, storage, transport and disposal of soil and water from these trenches.

The management plan is not an Asset Management Plan for Sub-transmission Underground cables.

2 Background

Throughout its distribution area, Ausgrid has an extensive network of approximately 11,000km of underground cables. Of the 11,000km only 420 route km are paper insulated with continuous fluid irrigation and are subject to this management plan. The 420km of fluid filled underground cable network is made up of roughly 85 feeders that contain around 4,000 joints and approximately two million litres of fluid. This consists of fluid in the cables, the pressure tanks, sealing ends and joints distributed across Sydney and Newcastle. The fluid filled cable network operated by Ausgrid consists primarily of 132kV cables with smaller lengths of three core 33kV, and very short lengths of 66kV.

The majority of these feeders are ex Electricity Commission assets transferred to Ausgrid in the 1990's. The cables form an integral part of the electricity transmission network.

Fluid-filled cables are typical of the technology used worldwide at the time, but is now considered an obsolete technology for cables operating at these voltages. **Table 2-1** provides an overview of the network.

Table 2-1 Underground Fluid Filled Cable Network

Voltage (kV)	Installation date	Locations	Comments
33	1945 – 1952	Inner Sydney (Darling Harbour Area)	33kV fluid cable now retired in the Sydney area
33	~ 1965	Newcastle area	Approximately 38km installed Approximately 25km remaining
66		Hunters Hill Carlingford	Retired in the Hunters Hill area 75 – 150m long and wholly within Carlingford STS
132	1963 - 1980	Throughout the Sydney Region	Approximately 455 circuit km fluid filled installed Approximately 392km remaining

As most of these cables are buried in the ground they are subject to environmental and mechanical stresses. Where these stresses result in damage of the metal sheath containing the insulating fluid it is possible that this fluid can leak into the ground, either from continuous small fluid leaks or infrequent catastrophic fluid leaks (often a result of 3rd party dig in), which requires prompt excavation and repair. They are in continuous use and are an essential part of Ausgrid's supply network, and therefore cannot routinely be taken out of service except for brief periods necessitated by the need for maintenance and repair. Details on cable design and installation are shown in **Appendix A**.

3 Issues

3.1 Cable Fluid

The fluid in underground cables is an essential part of the cable design. Its function is to improve performance of the cable by filling voids present in the paper insulation and so avoid cable breakdown. The fluid must be maintained at a positive pressure to inhibit the entry of air and moisture into the cable to prevent electrical failure occurring.

When laid, the cables contained a highly refined mineral oil. Cables were supplied from the manufacturer with the oil already filled into the cable and as the cable is a closed system no additional oil is required once the cable is installed. Therefore any cables which have not suffered damage, and not required repairs, will still contain mineral oil. Additional fluid is only added to the cable section if a leak occurs to maintain pressure and to prevent damage to the cable.

Since the early 1990s, mineral oil has been replaced by a blend of linear alkylbenzenes as the replacement fluid used in the cables. This fluid has better electrical characteristics, is readily biodegradable, and therefore more environmentally responsible.

See **Appendix B** for technical details on Linear Alkylbenzene Fluids.

3.1.1 Fluid Leaks

Leaks in underground cables are sometimes unavoidable. In Ausgrid's experience, and indeed around the world, the majority of leaks occur at joints and/or tanks rather than in the cable itself. This is because the transition from joint to cable is the weakest part of the system and therefore these points require less strain for a break or failure to occur. Most cable leaks are a result of determination of the cable or cable components however 3rd party damage accounts for most of the cable fluid losses

Causes of leaks include:

- damage by third parties,
- ground movement,
- the effects of traffic;
- termite damage;
- design problems (eg inappropriate sheath alloys);
- environmental influences (eg contaminated groundwater at Banksmeadow causing damage; to the PVC serving requiring work to replace this section of cable); and
- fatigue.

Further detail about typical failure modes, causes and follow-up action are outlined in **Table 3-1**.

Table 3-1 Failure Modes, Causes and Action

Failure mode	Cause	Action required
Wipe/plumb failure at joints.	Cable aluminium sheath is sealed to the joint copper shell using a wiped solder joint - this can crack and leak due to causes such as ground movement or poor workmanship.	Leaks are repaired by re-wiping, usually the adjacent joints will also be re-wiped at the same time if possible to prevent further leaks. Joint refurbishment (targeted rewiping based on risk factors before leaks are encountered) is being adopted on some cables where appropriate.

Failure mode	Cause	Action required
Fluid line/connection leaks.	Fluid lines are connected to stop/feed joints to supply fluid to the cable, these lines can leak due to corrosion, cracked connections etc.	Fluid lines are replaced with modern pipework, this is sometimes done on a complete circuit where recurring problems / common causes are encountered.
Cable sheath cracking.	Some transmission cables have a lead sheath, this can crack and leak due to corrosion, fatigue, reinforcement failure, ageing etc.	Cable sheath leaks are difficult to locate, involving multiple excavations to pinpoint the precise source of the leak. While the immediate leak can be stopped using a sleeve repair, deteriorated lead sheaths are vulnerable to further leaks due to the need to move the cables during repair works, and generally it will become necessary to replace long lengths or entire cables.
Termite damage	Termites can eat through a cable's outer PVC serving to leave the underlying aluminium sheath exposed to pinhole corrosion and fluid leaks.	A sleeve repair is used to stop the immediate leak, and the cable will be electrically-tested to detect whether serving damage is present elsewhere - this damage can then be repaired before further leaks occur. Termite-proof mesh was trialled in 2003 on cables in Moore Park golf course - this has been successful, with no further leaks to date. It would be impractical to use termite-proof mesh on most cables that are buried under roads - these should be periodically serving-tested to detect/repair damage before leaks occur, or it may become necessary to replace long lengths or entire cables.

Pressure due to the physical cable profile (the steepness of the ground that the cable traverses) is not believed to be a primary cause of fluid leaks. The cables are rated to 700 KPA and few cable pressures exceed 200 KPA. Historically few fluid leaks have occurred at the bottom of steep inclines.

When a leak occurs it is necessary to pump fluid into the cable to maintain the insulation in the cable. Thus in a leak situation, if the cable section has not had a leak before, the first fluid that leaks will most likely be mineral oil from the hollow duct in the centre of the cable. This will then be followed by the linear alkylbenzene fluid which is pumped into the cable to maintain operating parameters.

A cable has approximately 1 litre of fluid per metre of cable. Much of this fluid is impregnated into the paper insulation and is therefore bound up in the cable. It is only the fluid in the hollow duct (approximately 1/3 of the fluid in the cable) which readily escapes in the event of a leak.

Leak rates below 5 litres/day cannot be practically located with current leak location techniques.

Analysis of leaks between 1999 and 2002 has revealed that the system was losing approximately 34kL per year of fluid at a rate of 67L/km/year. The majority of leaks, 52.5%, were less than 1L/day, which is well below the rate of 5L/day at which the leaks can be located and another 16% leaked at a rate of 1-5L/day, still below the threshold level.

Since 2001 Ausgrid has achieved significant reductions in its cable fluid loses through proactive initiatives such as the implementation of this management strategy. The strategy set an initial leak reduction target for 2009 of 15% on the 2001 cable fluid losses (The 2001 rolling average leak rate was roughly 2,830L/month. The 2009 15% reduction was roughly 2,795L/month).

The 2009 target was achieved and a subsequent target has been set for 2014 of 30% below the 2009 target. This target is to achieve a monthly rolling average of 1,956L/month.

3.2 Pesticides

3.2.1 Historical Application of Pesticides (OCPs)

Termites can cause damage to the cable serving, which then exposes the sheath. Subsequent corrosion of the sheath can result in an fluid leak.

During installation between 1963 and 1980 the soil in some cable trenches was typically treated with organochlorine pesticides (specifically aldrin and dieldrin) to prevent the cables from being attacked by termites. No organochlorine pesticides (OCPs) were applied in cables installed after 1980.

Ausgrid cables are laid in trenches that are approximately 0.8 m wide and 1.1 m to 1.6 m deep. A concrete slab is placed above the cables. Pesticides were only applied to soils below the slab.

Termite resistant cables are now used and pesticides are no longer used in underground cable installations. See **Appendix E** for details on termite protection.

3.2.2 Concentrations of OCPs in cable trenches

In a 1997 study, undertaken by independent consultants Dames and Moore were commissioned by Ausgrid to conduct an environmental assessment of the 132kV fluid filled cable trenches to determine whether there was significant human health and environmental risk posed by any contamination associated with the pesticides in the trenches and to recommend a course of action.

The level of contamination of OCPs in soil from 132kV cable trenches within the Sydney area was determined from a statistical analysis of 20 sampling sites as part of the 1997 study, at predetermined locations, with five samples taken from various locations at each site.

Based on this investigation the concentration of dieldrin in soils directly above the slab has a 95% upper confidence limit (UCL) of 0.3 mg/kg. Given the method, by which pesticides have been applied to the trenches and the low potential movement of pesticides in the soils, it is unlikely that pesticide concentrations in surface soils exceed ANZECC B or Dutch guidelines or constitute a Scheduled Chemical Waste.

Concentrations of aldrin and dieldrin in soils below the slab have 95% upper confidence limits of 20 mg/kg and 2.8 mg/kg respectively. Therefore, soils below the slab (unless otherwise tested) are likely to be a Scheduled Chemical Waste.

The Dames and Moore study confirmed that only very low concentrations of OCPs were found above the concrete slab.

Dames and Moore's investigations revealed that:

- pesticides were only applied to soils below the slab;
- concentrations of aldrin and dieldrin (where detected) in the soils directly overlying the slab were significantly less than that detected below the slab;
- the upward movement of aldrin and dieldrin, is considered unlikely, and would be further restricted by the concrete or polymeric slab;
- aldrin and dieldrin adsorb strongly to soils, particularly where clay minerals and organic matter is present;
- aldrin and dieldrin have low mobility in soil, and only penetrate soil layers adjacent to the treated layer to a very small extent;
- aldrin and dieldrin are not easily leached, even in sandy soils with low organic matter content, and occurrence of either in groundwater is rare due to the extreme resistance to leaching; and
- the possibility of fluid in cable trenches is not considered likely to increase the mobility of pesticides.

In 2006, a further study was conducted by independent consultants Environ Australia (Environ) to provide an opinion on whether the conclusions and recommendations of the 1997 report are still valid. They found that the "conclusions of the 1997 study are considered to still essentially apply".

In 2010, a further study was completed by Coffey Environments to assess current legislative requirements and advise on environmental and OH&S requirements. The report found that "…the 95% UCL for aldrin and dieldrin, calculated by Dames & Moore (20mg/kg and 2.8mg/kg respectively) is still likely to be representative of conditions across the network."

The sampling undertaken as part of the 2010 Coffey Environments report supported previous results provided by Dames and Moore.

3.2.3 OCPs - Summary of Conclusions

The concentrations of pesticides and cable fluid in the soils below the slab and adjacent to the cables are such that, when combined with the controls in place and the above knowledge gained from independent investigations, will effectively manage the risks to workers, the public and the environment.

Aldrin and dieldrin are highly stable, bind strongly to soil and do not leach into ground water. Furthermore, dieldrin has a long half-life and period of activity. Those properties, combined with the concentrations determined by the investigation by Dames and Moore, indicate that the undisturbed cables that were treated with aldrin and dieldrin are still adequately protected against termites.

The Environ review concluded that there is a very low likelihood of exposure of the general public to these pesticides, even though the cable trenches pass under publicly accessible areas. The average concentrations were equivalent to the health investigation level for parks. Accidental exposure to the very low concentrations of pesticides above the slab were considered to be a slightly higher risk, however, "there appears to be a very high safety margin".

The Coffey Environments review concluded that "If the cable trenches are left in-situ and undisturbed, the risk to human health and the environment is considered to be low". "The main potential exposure is during cable maintenance activities when the material may be disturbed (ie during cable maintenance operations)". The report found that the exposure path could be effectively managed with suitable controls as detailed in this plan.

4 Environment

4.1 Land Contamination

Soils in cable trenches may be either contaminated with OCP pesticides or cable fluid. The concentrations of both are primarily confined to the soils below the slab. Aldrin and dieldrin adsorb strongly to soils, hence they are likely to be confined to the soils below the slab in the cable trench with "low mobility under most conditions" (Environ 2006 p6).

The Environ review undertakes a broad assessment of whether the cable trenches represent a Significant Risk of Harm (see Environ 2006 p6). The cables trenches are not considered to be a significant risk of harm as the pesticides are not water soluble, bind strongly to soils, are confined primarily to the soil below the slab, and have very limited exposure to the general public.

This is further confirmed in the Coffey Environments review "With regard to pesticide residues, in normal circumstances (i.e those consistent with the Dames & Moore (1997) sampling) there is unlikely to be a duty to report under s60 of the CLM Act…".

The migration potential of these OCPs are higher in organic solvents, and therefore may increase where there are cable fluid leaks. Major fluid leaks are investigated by Ausgrid's Environmental Services as part of the incident investigation process, so these situations are assessed as they arise, typically as part of the cable repair process.

Waste disposal of contaminated soils is heavily regulated. The excavated waste soils and water are carefully managed in accordance with Ausgrid's waste guidelines (see **section 4.3**). Where possible, soils are reinstated onsite in their original configuration of soils below the slab and soils above the slab remaining in their profile and reused so as to continue to provide termite protection. Alternatively they are removed from site as waste and tested to determine their waste classification for appropriate disposal and/or treatment.

The Coffey Environments review considers that where excavation or other disturbance of potential pesticide contaminated soils is carried out in accordance with an EMP, there would be low potential for land and/ or water pollution to occur, as defined in the POEO Act (1997).

4.2 Possible Migration to Water Bodies

Pesticides and cable fluid could enter a water body in sediment. Several scenarios are possible where this could occur;

- Excavation of soils and failure of appropriate management, for example by inappropriate stockpiling of excavated soils or failure of containment in rain conditions;
- With liquids, either accumulated in the trench or used for dust suppression;
- Failure by other factors, such as ongoing erosion or catastrophic erosion caused by storm, flooding, earthquake; or
- Submarine cables.

These scenarios are controlled by appropriate management and inspection procedures, typically as part of the incident investigation process including inspection of water bodies.

As aldrin and dieldrin are not water soluble and readily adsorbed to soil particles, pore water migration in soil is not likely to be the preferential pathway for these compounds.

As the solubility increases in organic material, it is possible that migration could occur in the event of an fluid leak. While the fluid itself would not be particularly mobile either, some migration could be possible in the event of long term or major leaks combined with unfavourable subsurface conditions, eg. permeable sandy soils and proximity to a receptor water body. In most cases, the fluid and any dissolved pesticides would be more likely to absorb to clayey soils on the trench walls and not migrate beyond the trench. In the Dames and Moore 1997 study, samples were obtained from one trench where a fluid leak occurred. Fluid was found to not have migrated far from the cables in high concentrations. In this case, pesticide concentrations were low.

4.3 Waste Management

Soils in the cable trenches may be contaminated with pesticides and cable fluid. Waste containing the pesticides may be subject to strict controls necessitating licences and approvals for storage, transport and disposal.

Ausgrid's EG 120 Waste Guidelines details the waste requirements relating to soil and water from cable trenches as follows.

4.3.1 Additional requirements for soil or material from 132 kV cable trenches

The soil surrounding Ausgrid's 132kV underground cables installed prior to 1980 may be contaminated with cable fluid and Organochlorine Pesticides (OCP). Typical waste classifications for this soil shown in **Table 4-1** below.

Table 4-1 Typical waste classification of soil from 132kV trenches

	EPA Waste Classification Guidelines	Environmentally Hazardous Chemicals Act 1985
Soil from above the slab - typically OCP<0.3mg/kg	General solid waste [A]	n/a
Soil from below the slab - typically OCP<20mg/kg	General solid waste [A]	Scheduled chemical waste [B]
Water from the trench – typically OCP<20mg/kg	Liquid waste [A]	Scheduled chemical waste [B]

[A] This cannot be relied on if the soil or water is suspected of being contaminated with cable fluid or any other substance. Testing should be carried out to determine the waste classification.

[B] Scheduled Chemical Waste has a concentration of Total Scheduled Chemicals > 2mg/kg.

Waste containing these pesticides may be subject to strict controls necessitating licences and approvals for storage, transport and disposal. The minimum controls are detailed in Network Standard *NS156 Working near or around underground cables* which is available to all people working on or near Ausgrid's underground cables. In summary the controls include:

WH&S Controls

The following minimum safety requirements must be implemented for the management of OCPs in Ausgrid's 132kV fluid filled cable trenches:

- Wear protective clothing. Clothing must provide coverage of arms and legs (i.e. overalls or long sleeved shirts and long trousers). Normal laundering is considered suitable for decontamination purposes.
- Wear safety footwear. In wet conditions gumboots are recommended. Bulk accumulated soil (such as mud or soil build up) should be removed from footwear before leaving the site.
- Wear gloves. Leather gloves are considered suitable, however, PVC coated gloves are preferred. Gloves should be disposed after use (Gloves are not required where their use is impractical provided the work area is clear of excess soil from below the protective slab and any adjacent cables are covered. Hands should be washed after working without gloves).
- Apply good industrial hygiene practices. No smoking, eating or drinking whilst working in contaminated areas and wash hands and face prior to smoking, eating or drinking.
- Use eye protection. Wear safety glasses or safety goggles where excessive dust is generated. The use of dust masks should be assessed and if considered prudent they should be used. Dust control measures must be applied.

Note: An Occupational Hygienists can provide more specific advice regarding the handling of OCPs.

Note: These matters must be included in any site specific hazard assessments prior to the commencement of works.

Managing Water

Where the presence of OCPs has been identified or has not been ruled out, accumulated water from Ausgrid's 132kV fluid filled cable trenches may contain OCPs. The following minimum controls must be applied:

- Minimise the volume of contaminated water generated. Where possible, minimise rainwater or 'run-on' water entering trenches e.g. cover trenches and divert water around trenches.

- Do not allow uncontrolled water to leave the site. Accumulated water from the trench must not be released to any waterway or discharged onsite. Accumulated water must be collected and managed in accordance with *Waste Management* below.
- Do not allow uncontrolled soil to leave the site. Prevent soil or any contaminants entering any waterway e.g. use sediment control devices.

Note: Handle and dispose of used sediment control devices as OCP contaminated. See Section 9 Waste Management below.

Handling Soil

Where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied when soil is being handled:

- Prevent dust generation, especially from stockpiled soil.
- Keep soil from below the protective slab separate from soil from above the protective slab. Manage soil from below the protective slab in accordance with *Storing Soil* below. Soil from above the protective slab has no special handling requirements with respect to OCPs.

Storing Soil

Where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied when soil is being stored:

Note: These requirements can be satisfied by using a waste facility licensed to store Scheduled Chemical Waste.

- Soil excavated from Ausgrid's 132kV fluid filled cable trenches must be contained in a plastic lined and covered secure bin to prevent water ingress or dust escape.
- Any person handling the waste is trained in handling Scheduled Chemicals and methods of containing Scheduled Chemical spills, and wears personal protective equipment.
- All packages / storage containers are clearly labelled and maintained in good order.
- Where more than 50kg but less than 1 tonne is stored, ensure that:
  - There is a clearly defined storage area with conspicuous warning notices identifying the area.
  - The storage area is constructed to prevent discharge into the external environment. For soil this can be satisfied by storing in a lined and covered bin.
  - An adequate supply of personal protective equipment, clean-up material and equipment is available in a secure location external to the storage area.
- Where 1 tonne or more is stored you will also require and need to comply with the conditions of a licence under the Environmentally Hazardous Chemicals Act 1985.

Reinstatement

When reinstating trenches where the presence of OCPs has been identified or has not been ruled out, the following minimum controls must be applied:

- Where possible soils should be reinstated and not disposed of off-site.
- If soil is not contaminated with cable fluid (or anything other than OCP) it can be replaced in the trench to original depths. Soil excavated from below the protective slab must be reinstated below the protective slab. This reduces potential exposure pathways as contaminated soils are not at the surface and provides continued termite protection for the cables.
- Where soil contains contaminants such as cable fluid, etc., the fill material should be disposed off site to a suitably licensed waste facility, refer to *Waste Management* below.

Waste Management

There are two options for the management of spoil from Ausgrid's 132kV fluid filled cable trenches:

1. Where possible soils should be reinstated to the original depth and not disposed of off-site.
2. Where spoil and liquid waste is required to be disposed off-site the waste must be classified in accordance with the NSW DECC's Waste Classification Guidelines. This sampling must include OCPs.

Note: When working below the protective slabs, sediment control devices from the work site and liquid waste (i.e. water) from the trench should be managed the same as spoil from below the protective slabs.

When transporting spoil where the concentration of Aldrin or Dieldrin in the soil is 50mg/kg or greater, or the presence has not been ruled out, the following additional controls apply:

- The transport vehicle must carry personnel trained in containing spills of OCP contaminated spoil.
- Appropriate PPE, clean up material and equipment must be carried on the transport vehicle.

4.4 Environmental Guidelines

In addition to this document, Ausgrid guidelines that are relevant to the environmental management of fluid filled cables include:

- EG 001 Environmental incident response
- EG 100 Oil handling and spill response
- EG 120 Waste Guidelines
- EGN 101 Oil spill containment and clean up guide
- NS156 Working near or around underground cables
- NUS 174c Environmental Handbook

5 Health and Safety

5.1 Exposure Scenarios

5.1.1 Public

The following is an extract from the Environ review.

" The cable trenches pass under publicly accessible areas such as golf courses and parkland. Although the average concentration of aldrin plus dieldrin is equivalent to the health investigation level for parks, there is no exposure pathway and therefore no risk to the general public. Accidental exposure is not possible because of the presence of a concrete slab above the cables, irrelevant to the concentration of pesticides.

There is some risk of accidental exposure to the low concentrations of pesticides found above the concrete slab, for example by landscaping activities. The maximum concentration detected above the slab was less than 1 mg/kg. This is well below the long term residential guideline of 10mg/kg that is calculated on the basis of exposure over 70 years. There appears to be a very high safety margin.

Exposure risk could occur by failure of appropriate management of excavated soil, for example, if excavated soil was spread onto adjoining areas."

5.1.2 Maintenance workers

The following is an extract from the Environ review.

"Maintenance workers would be exposed to pesticides when trenching to conduct repairs. A preliminary assessment based on the average soil concentration of 20mg/kg for aldrin and 3 mg/kg for dieldrin indicated that the reported soil concentrations do not exceed the NEPM HIL-F value of 50 mg/kg, which is based on long term exposure. A calculation for maintenance workers using a risk assessment process (enHealth 2004) based on conservative assumptions (see attached) also indicates no intolerable risks (ie. hazard index <1) . While higher concentrations of pesticides could occur, it is reasonable to consider that workers could be exposed to the average concentration over the 30 years assumed in the calculation.

The calculations make assumptions that essentially ignore the risk-reduction measures that apply to maintenance workers as outlined in Section 1. The use of protective clothing and application of good hygiene, and dust suppression, would essentially reduce the exposure pathways to workers to negligible levels. Although the risk calculation indicates a low risk, these precautions should still be taken because it is desirable to reduce exposure to as low a level as possible, and there may be concentrations of pesticides around the trenches higher than those detected in the D&M [Dames & Moore] study."

5.2 WHS Requirements

In order to manage (and where possible remove) risks to people or the environment, the following activities are subject to specific WHS requirements:

- Excavation, restoration and working around fluid-filled cables trenches
- Storage and transport of soil and water from below the slabs
- Disposal of soil and water from below the slabs

Where people are likely to come into contact with soil around Ausgrid's cables, it is necessary to effectively manage soil and water removed from the trench (which may be contaminated with pesticides and fluid). Environmental and health control measures are emphasised to minimise the potential pollution risks to the environment, and health risks to the public and people working in or around the cables.

The minimum controls are detailed in *Network Standard NS156 Working near or around underground cables* which is available to all people working on or near Ausgrid's underground cables. Information is also detailed in **section 4.3.1**.

These controls include:

- No smoking, eating or drinking while in contact with potentially contaminated areas;
- Wash hands and face prior to smoking, eating or drinking;
- Wearing of long sleeves and long trousers. (For the concentrations present, normal laundering is considered suitable for decontamination purposes);
- Wearing of gloves. PVC coated gloves are preferred, however leather gloves are considered suitable. Gloves are not required where their use is impractical provided the work area is secured to be clear of excessive soil from below the slab and where any adjacent cables are covered;
- Wearing of safety footwear and gumboots are recommended in wet conditions; and
- Where a cable leak has contaminated the area, additional skin coverage such as disposable overalls or equivalent may be used.

Where dust is generated:

- Eye protection such as safety glasses or safety goggles should be used to avoid foreign bodies entering the eye;
- The use of dust masks should be assessed and if considered prudent they should be used;

- Dust control measures must be applied to removed soil and stockpiles;
- All loads must be covered to prevent dust generation and dispersal; and
- Minimisation of dust generation when unloading waste.
- Ausgrid procedures that are relevant include:
- this document
- Safe Work Method Statements

5.3 Communicating with the Public

Any concerns raised by members of the general public are addressed in accordance with Ausgrid's incident response procedures. These procedures detail how to respond to leaks, concerned customers, contact with the EPA and any other enquires regarding this issue.

6 Management Strategies

6.1 Benchmarking

In 2001 a national Strategic Technology Programme (STP), which is part of an international network of regional STPs, was formed by eleven of Australia's electricity utilities. The founding members of the Australian STP were: Ausgrid (formerly EnergyAustralia), United Energy, Energex, Endeavour Energy (formerly Integral Energy), Ergon Energy, Powerlink, North Power, Aurora Power, Powercor, AGL Electricity and Citipower. The objective of the STP is to share knowledge, research results and technology development projects. The group is managed by the Energy Networks Association (ENA) on behalf of members. The STP provides a forum where Ausgrid can keep abreast of technological developments both nationally and internationally.

A narrow review of practices used at other electricity utilities revealed the following:

Table 6-1 Review of international utility practices

Electricity Utility	Current Practices
Consolidated Edison (New York)	• Oil filled cable network is predominately constructed of 'Pipe in Trench' which differs in design to Ausgrid's system but subject to similar constraints. • A programme to replace oil filled feeders with solid cable (XLPE) where they cross waterways.
Com Ed, Chicago	• Oil filled cable network is predominately constructed of 'Pipe in Trench' which differs in design to Ausgrid's system but subject to similar constraints. • Do not have direct laid oil filled cables. • A programme to replace oil filled feeders with solid cable (XLPE) commenced in 1996.
China Light and Power	• Cable replacement based on technical and economic justification. • Replacement of oil filled feeders with solid cable (XLPE). • Minimal environmental regulator involvement.

Electricity Utility	Current Practices
UK National Grid	• This cable network is comparable in design to Ausgrid's system, but is considerably older (1940s+). • A programme of refurbishing underground cables. • A programme to replace oil filled feeders with solid cable (XLPE) when they reach the end of their service life. **Note:** these cables are up to 25 years older than Ausgrid cables
Yorkshire Electricity	• Oil filled cables are monitored by automatic alarms. • Use biodegradable fluid instead of mineral oil. • Replacement of oil filled feeders with solid cable (XLPE). **Note:** These practices are the same as those used by Ausgrid
TXU UK	• Replacement of oil filled feeders with solid cable (XLPE). • A programme of refurbishing underground cables.

This search has verified that Ausgrid's maintenance practices, leak location techniques and refurbishment/replacement are equivalent to those used by other utilities.

6.2 Monitoring and Maintenance

Ausgrid carries out periodic tests and inspections of its fluid filled cable systems to identify potential failures. All fluid filled cables are constantly monitored remotely via alarmed pressure gauges fitted at fluid feed points. These gauges are fitted with alarms that register in the control room when pressure drops below the threshold level. Additionally, periodic manual gauge readings are undertaken to check the performance of the monitoring equipment and to endeavour to identify trends in fluid pressures before an alarm is triggered. **Table 6-2** below details the planned maintenance checks and schedule used by Ausgrid.

Table 6-2 Maintenance Schedule

Test	Purpose	Frequency
Sheath integrity	Indicates the condition of the outer (generally PVC) serving of the cable. If damaged, subsequent corrosion of the metallic sheath could lead to cable fluid leaks and ultimately breakdown of the cable. Cable must be out of service for this test to be undertaken.	5 yearly
Oil pressure Manual gauge readings	Testing is undertaken to confirm that pressure switches and alarms are operating correctly. Trends in cable fluid pressures can be identified which is an indicator of potential leaks - readings are to be recorded and checked against previous readings to determine whether the cables have a leak. Single level alarms Multi-level alarms	 6 monthly 12 monthly

Test	Purpose	Frequency
Test cable fluid • Dielectric Strength greater than 25kV • Moisture Content (Karl Fischer test) • DLA not more than 15 milliradians • Residual gas pressure • Dissolved Gas Analysis (DGA)	Checks the quality of the insulating fluid of the cable. This information can be used to assess the possible rate of degradation of the cable insulation.	5 yearly
Monitoring equipment (pressure gauges, pressure switches, valves and manifolds)	Monitoring equipment is inspected and tested to confirm reliability. Single point. Multi point.	 3 monthly 6 monthly
Earthing check	Check cable serving insulation resistance to earth for each cable section is greater than 1MΩ	5 years
SCADA	Electronic alarm system.	Continuous

6.3 Leak Detection and Location

When a leak occurs, resulting in a drop in fluid pressure below threshold limits, alarms are initiated and leak detection procedures are implemented. However, very small leaks are almost impossible to locate as a flow rate of approximately 5L/day is needed before the leak can be located. Below this rate there is no known proven and reliable method for locating the leak. Trials have occurred, examining the feasibility of using perfluorocarbon tracer gas, injected into the cable fluid, to provide a reliable method for leak detection at rates <5l/day. These trials have shown that the technology is still being developed for use in Australia at this stage and Ausgrid is continuing to further investigate the use for future applicability. Currently, if the leak is <5L/day, regular checks of the on-site gauges are undertaken along with visual inspections of the section of cable with the leak.

Ausgrid uses two methods to detect the occurrence of a fluid leak

- Alarms indicating low pressure in a section of cable and
- Reading of fluid pressure gauges.

Once a fluid leak can be located, a digital manometer is used to detect which phase has the leak and the leak rate. The actual leak location is found by using either the flow board method or by freezing sections of the cable (See **Appendix D**). Fluid pressure may be reduced when the leak becomes severe and the cable has been de-energised. However, it is necessary to keep fluid flowing in the cable to prevent further damage.

Ausgrid uses flow board techniques as results can be achieved more rapidly, at lower cost and without potential damage to the cable. Flow boards can generally provide an identifiable result within eight hours, whereas a series of freezes on a section of cable may take 1-2 weeks and generate additional waste as more excavations will be needed.

Other possible leak location methods are discussed in **Appendix D**.

6.4 Preventing damage by 3rd parties

The likelihood of unauthorised excavation (that is not approved by Ausgrid) in the vicinity of the cables is minimised by following mechanisms:

- Ausgrid has a comprehensive public awareness campaign focused on the public safety around electrical infrastructure. The 'Dial-Before-You-Dig 1100' service used by excavation companies offers early warning to people wishing to excavate in the vicinity of any underground infrastructure (ie electrical and communication cables, gas, sewage and water pipes etc).
- New legislation was introduced in 2009 to make it compulsory under the *Energy Legislation Amendment (Infrastructure Protection) Act 2009* to notify Dial Before You Dig of the time and place of excavation works no more than 30 days before works commence. In addition penalties for inference with electricity and gas works have been doubled and network operators can recover costs associated with damage to mains and cables. In some cases the locations of 132 kV underground cables are indicated by appropriate markings on the roadside and kerb.
- Route markers are installed along the non road sections of transmission cable routes. The above ground markers are a visual indicator of underground transmission cable routes to warn people of the presence of these cables. The markers include contact details and are inspected as part of regular maintenance activities.
- In the event of unauthorised excavation actually taking place, the presence of a concrete slab (or polymeric covers) above cables marked 'Danger Electricity', alerts an excavator before there is the possibility of reaching the cables and contaminated soil.
- Ausgrid provides a qualified 'standby' person to oversee all excavations within 2 meters of all transmission cables to ensure work is undertaken in accordance with the relevant standards to prevent damage.
- The routes of strategically important 132kV cables are patrolled regularly by Security Patrols to detect any civil works which may pose a risk of damage to the cables.

6.5 Repairs

Repairs are carried out as soon as the leak has been located and the relevant Network and Authority approvals (eg RMS) have been obtained. Repairs involve excavating the damaged cable/joint and determining the reason for the leak (eg cracked fluid pressure seal) and thus the repair necessary. A specialist team undertakes the repairs and once finished the trench is reinstated. This generally takes 3-5 days once the fault has been identified. Additionally when repairs are undertaken:

- all replacement fluid pumped into the cables is biodegradable linear alkylbenzene
- whenever a leaking joint is excavated, subject to Network constraints, the pressure seals of all joints within that excavation are checked and remade, if necessary, to ensure that the risk of a fluid leak at this point is minimised
- fluid cables are only used to replace existing sections of fluid-filled cable where it is impractical or uneconomic to use non-fluid-filled (polymeric) cable
- soils removed from above and below the slab are kept separate. The soil obtained from below the slab has an effective concentration of pesticide and placing that soil back under the slab (in accordance with Ausgrid's guidelines) ensures continued protection of the cable – any soil that is contaminated with cable fluid is not replaced in the trench but is properly classified and disposed
- in the case where replacing the soil is not possible, or additional protection is required, such as in areas of high termite activity (Eastern Suburbs); consideration should be given to the protection mechanisms outlined in **Appendix E**; and
- work on fluid-filled cables is only permitted by fully qualified and experienced pressure cable staff.

Ausgrid has also taken a number of steps to ensure there are suitable resources and technical expertise to carry out repair and maintenance work on its Fluid Filled Cable network now and into the future. These actions help to ensure cable leaks are repaired quickly and to the highest standard to reduce the time taken to repair cable leaks and reduce the occurrence of future leaks. These actions include:

- storing suitable 'Network Spares' of equipment and materials required for the repair of fluid filled cables to allow the early repair and maintenance of damaged and leaking equipment
- employing specialist staff and providing ongoing training for these staff for the repair and maintenance of fluid filled cables
- providing round the clock 'on-call' staff available to respond to cable fluid leaks.

6.6 New and Replacement Infrastructure

No new fluid-filled cable circuits have been installed since 1990 and all new underground cable installations are non-fluid-filled cables. Alternatives to fluid-filled cables include overhead lines and non-fluid-filled cables (eg solid dielectric type).

Whenever a section within a feeder needs to be replaced the alternatives of fluid-filled, overhead or solid dielectric are evaluated and the most practical and cost effective solution is chosen.

To install a non-fluid section into an existing fluid-filled cable requires the installation of transition joints to prevent the fluid from entering the non-fluid section. Technically a non-fluid section is also a problem as it is vital to ensure there are no "blind" spots in the circuit where fluid may drain away during extremes of temperature (typically ranging from 35° - 80°C throughout the day). This may require the installation of fluid tanks at the 'stop joints', which are likely to be located in public roads or reserves. There are maintenance and environmental concerns associated with tanks in these areas. 'Stop joints' are also significantly more expensive than a normal 'in-line' joint.

Community, political and environmental expectations (eg visual amenity) mean that overhead lines are not generally a preferred option, particularly in the Sydney metropolitan area.

6.7 Replacement program

Ausgrid's has initiated a cable replacement program aimed at retiring its fluid filled cable network. In general the programmed is planed with cables crossing major waterways prioritised for retirement by 2020, then cables crossing secondary waterways prioritised for retirement by 2025 and all remaining cables by 2030.

Over the past 5 to 10 years Ausgrid has decommissioned approximately 32km of its fluid filled cable network.

As part of the program a replacement priority has been determined on a risk assessment which considers both environmental factors and network needs. The replacement priority addresses environmental risk of the fluid filled cable network while meeting the operational needs of the network. The risk assessment considered:

- leakage rates
- feeder reliability
- availability for service
- environmental sensitive (river crossing)
- access limitations (RMS road)

The program will be delivered across multiple regulatory periods and delivery of the program will be subject to funding approval for the 2015-19 and future regulatory periods from the AER.

Figure 6-1 Proposed fluid filled cable replacement program – Sydney area

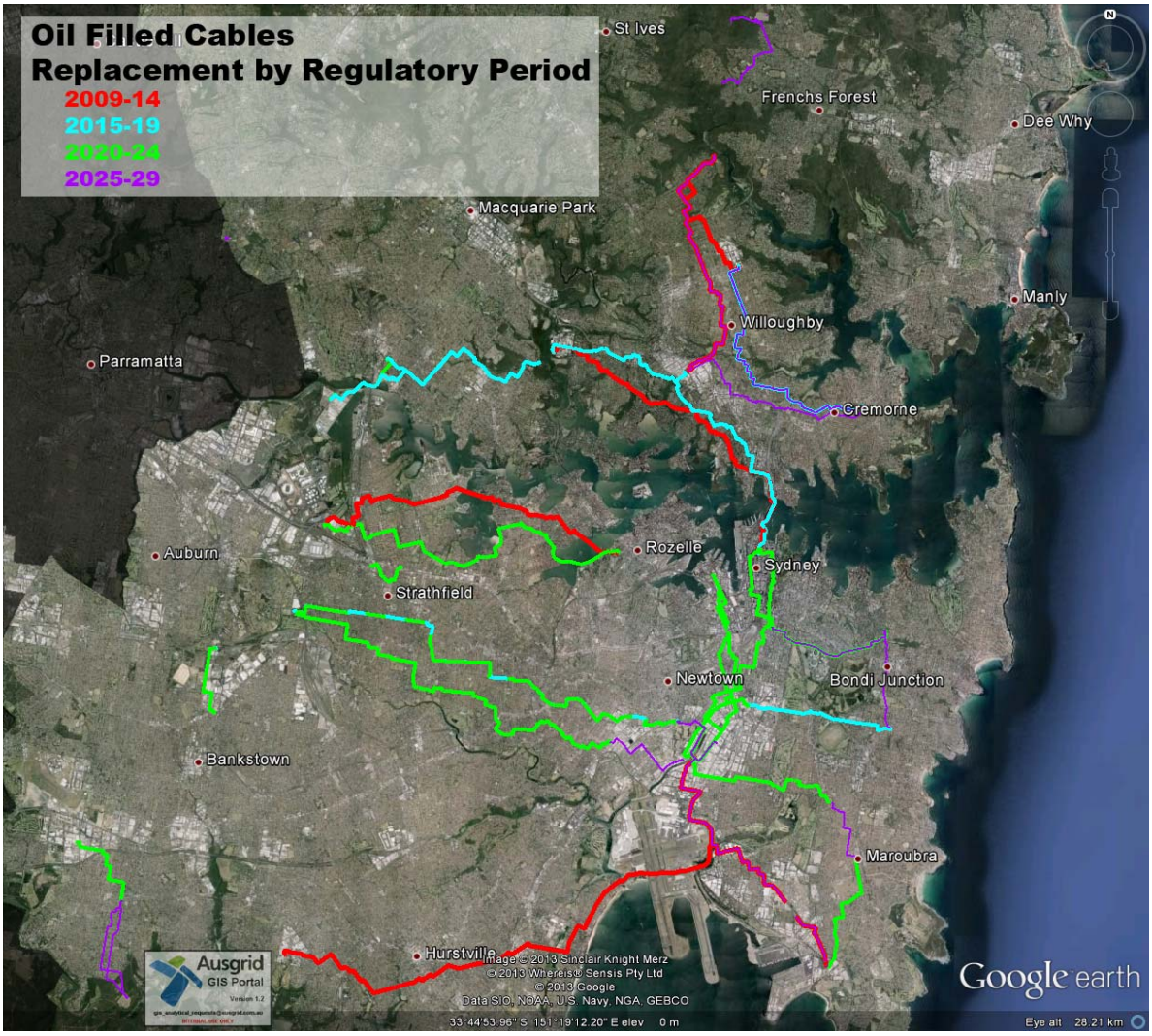
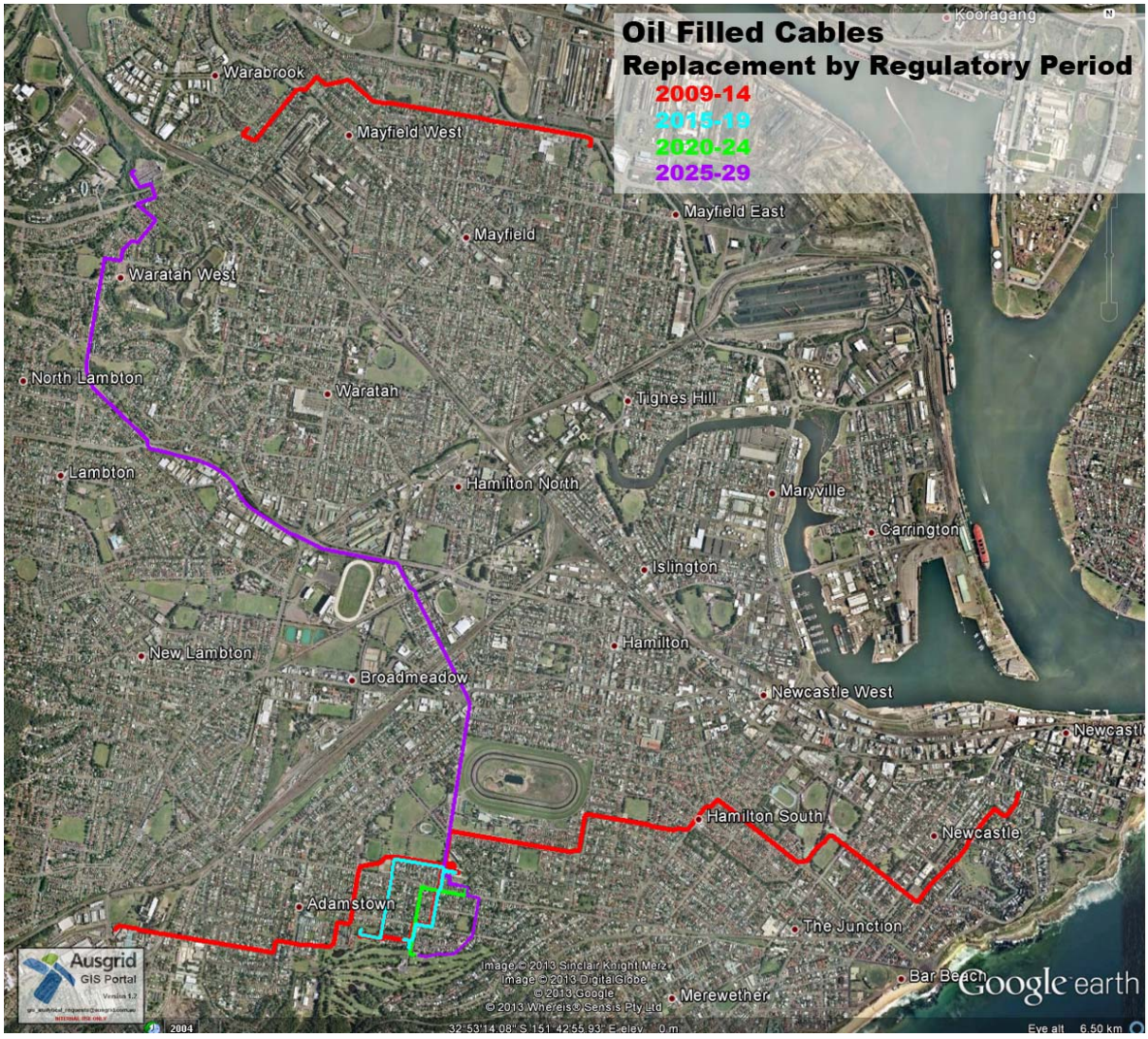


Figure 6-2 Proposed fluid filled cable replacement program – Newcastle area



6.8 Decommissioning fluid-filled cables

When fluid filled cables reach the end of their useful life, there are 3 key options for decommissioning:

1. Drain, remove and dispose the fluid filled cable, or
2. Drain the fluid filled cable and re-commission the cable for lower voltage use, or
3. Drain the fluid filled cable and abandon the cable insitu.

In October 2007, Parsons Brinkerhoff prepared an Environmental Risk Assessment for the Removal of Submarine Transmission Cables from Pyrmont to Rozelle Bay. This risk assessment identified that all three options (remove, re-commission and abandon) present potential risks to the environment which must be addressed and will require project specific solutions.

Fluid filled cables were traditionally 'direct laid' in trenches and often within the carriage way of major roads and transport corridors. As such there would be significant costs associated with their removal, the work has the potential to cause significant disruption to the community and there are risks to other utility services buried in close proximity to the cables.

Given the potential environmental impact associated with their removal, technical feasibility and social benefit it is considered that abandoning these cables in-situ presents the best available option in most situations. This is also consistent with practices of other international electrical utilities.

Ausgrid's general practice is to remove as much fluid as is reasonably practicable and then leave the drained cable in-situ. This activity generally includes:

- cut, cap and make the cable safe
- drain free fluid from the cable
- removal of any underground and aboveground fluid tanks
- removal of any associated cable accessories (e.g. link boxes)
- retain the cable listing on Ausgrid's GIS to enable reporting for DBYD enquiries

However, the final solution will depend on technical and site specific environmental requirements of each decommissioning project.

7 Environmental Management Plan

Minimising the environmental risk associated with the operation, maintenance and repair of fluid filled cables is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from cables maintenance, repair, reporting, replacement and other improvement projects outlined in this strategy.

Key measures include:

- Use of biodegradable linear alkylbenzene as the replacement fluid for the cables.
- A commitment to use non fluid filled (Cross Link Ply-Ethylene (XLPE)) cables for all new feeders.
- A range of strategies to prevent unauthorised excavation such as Dial Before You Dig, patrols, handouts and seminars.
- Maintenance, monitoring, resourcing and training procedures.
- Internal and external reporting procedures commencing when leak rates reach locatable levels (currently 5L/day).
- A commitment to continue to target fluid losses 30% below the 2009 (which was a 15% reduction on the 2001 level) target.
- A commitment to adopt proven technologies that will improve performance as soon as possible.
- Ausgrid is currently planning for the replacement of fluid filled cables by 2030 (target date, subject to AER approval of appropriate levels of capital funding).
- A commitment to report against, review and update this plan on an annual basis.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **1. Prevention of Damage by other than Ausgrid.**						
To minimise the likelihood of excavation causing damage to underground cables.	Increased awareness to external parties of cable locations to prevent unauthorised digging.	**1.1.1** - The 'Dial-Before-You-Dig' 1100 service used by excavation companies offers early warning to people wishing to excavate in the vicinity of any underground infrastructure.	Ongoing service.	Network Data & Performance.	Ongoing service provided.	Ongoing service provided.
		1.1.2 - Ausgrid provides a standby person for works near 132kV fluid-filled cables to ensure no damage occurs.	Ongoing service.	Underground Transmission Mains.	Ongoing service provided.	Ongoing service provided
	Increased awareness to external parties of dangers of unauthorised digging.	**1.2** - Ausgrid participates in periodic DBYD seminars for civil contractors.	Ausgrid participates in periodic Dial Before You Dig (DBYD) seminars for civil contractors, presenting information on the hazards associated with damaging Ausgrid cables, how to avoid it and reading Ausgrid plans.	Network Data & Performance.	Seminars attended as required.	Seminars attended as required.
	Use of route markers in non-road sections of sub-transmission cable routes as documented in NS168.	**1.3** - Route Markers installed and maintained for cable sections installed in locations other than public roads.	Route markers for non road sections are inspected and maintained during 5 yearly maintenance inspections.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	Warning slabs/covers in place in all cable trenches as documented in NS168.	**1.4** - In the event of unauthorised excavation actually taking place, the presence of a protective markers above cables marked 'Danger Electricity', alerts an excavator before there is the possibility of reaching contaminated soil.	Protective markers are installed in all trenches and any damage during repairs or due to unauthorised excavation are replaced.	Underground Transmission Mains.	Ongoing.	Ongoing.
	All unauthorised digging is detected before damage occurs.	**1.6** - Patrol the routes of strategically important 132kV cables to detect any civil works which may pose a risk of damage to the cables.	Patrol nominated routes at specified frequency. All 132kV fluid-filled cables are patrolled at intervals ranging from 1 day to 1 week, depending on system importance.	Underground Transmission Mains.	Ongoing.	Ongoing.
Aspect **2. Maintenance**						
To maintain cables in optimum operating condition, To identify any weakness prior to a leak occurring and To maximise life expectancy of system.	All maintenance checks are carried out on schedule and identified problems are addressed promptly.	**2.1** - Regular preventive maintenance programme.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	All monitoring equipment maintenance for 2012-2013 completed.	All monitoring equipment maintenance schedule completed each financial year.
	5 yearly.	**2.2** - Sheath integrity test.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	Maintenance undertaken as required.	Maintenance undertaken as required.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	3 – 6 monthly.	**2.3** - Fluid pressure monitoring.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	All monitoring equipment maintenance for 2012-2013 completed.	All monitoring equipment maintenance schedule completed each financial year.
	3 monthly.	**2.4** - Pressure monitoring equipment.	Maintenance records show all checks are carried out on schedule.	Underground Transmission Mains.	Maintenance Schedule completed for 2012-2013.	Maintenance schedule completed each financial year.
To ensure cables are adequately protected from attack by termites.	Ongoing protection against termite attack.	**2.5** - Where repairs are undertaken the soil obtained from below the slab has an effective concentration of pesticide and placing that soil back under the slab ensures continued protection of the cable.	No damage arising from termite activity.	Underground Transmission Mains.	Ongoing.	Ongoing.
	Adequate termite protection in high termite risk areas showing termite damage (excluding roads).	**2.6** - Anti-termite 'Termimesh' protection applied in areas of identified termite activity (excluding roads). Cable replacement may be accelerated depending upon the extent of the problem, cable age and cable condition.	Anti-termite 'Termimesh' protection applied in these damaged areas or cable replacement accelerated.	Underground Transmission Mains.	As required.	As required.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **3. Leaks.**						
To respond promptly to a known leak which is locatable (ie >5L/day) and to minimise the time to undertake the repair.	Minimise time from when leak >5L/day identified to when feeder outage obtained.	**3.1** - Transmission to request network outage from Network Control and notify Environmental Services within one business day of leak reaching >5L/day as identified from pumping sheets to obtain feeder outage.	Outage requested from Network Control and Environmental Services notified within one business day of leak reaching >5L/day as identified from pumping sheets.	Underground Transmission Mains Network Data & Performance.	Monthly reports prepared pending migration into SAP.	Cable fluid losses captured in SAP.
	Minimise time from when leak >5L/day identified to when notify EPA.	**3.2** - Notify the EPA of leaks >5L/day which cause or threaten material harm to the environment immediately after becoming aware.	EPA notified by Environmental Services immediately after notification.	Environmental Services Underground Transmission Mains Network Data & Performance.	Monthly reports prepared pending migration into SAP.	Cable fluid losses captured in SAP.
	Minimise time from when leak >5L/day identified to locate leak.	**3.3** - Continue to use technology which gives the quickest and most accurate result in locating leaks.	For all leaks >5L/day, leak location commenced within 3 working days of feeder outage. **NOTE** – subject to Network constraints, road authority conditions and rain.	Underground Transmission Mains.	Ongoing.	Ongoing.
		3.4 – Improve visibility of fluid pressure and alarms on fluid filled cables.	Investigate and report on the ability to install digital fluid pressure monitors and alarms on the cable network connected to SCADA.	Underground Transmission Mains.	Undertake trial and report on findings.	Recommendations implemented.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
	Minimise time from when leak >5L/day identified to when leak stopped.	**3.5** - Measure the mean time from when leaks reach >5L/day as identified from pumping sheets, to when repairs commence.	Collect data in ST cables database and analyse mean time on a monthly basis.	Underground Transmission Mains.	Ongoing.	Ongoing.
	Technology able to accurately locate leaks at a rate lower than 5L/day.	**3.6** - Investigate new technologies in order to improve locating leaks and to be able to detect leaks at lower rates.	Proven technologies are adopted as soon as practical.	Underground Transmission Mains.	Investigate and report on the use of Tracer Gases (PFT) for leak location.	Ongoing.
To progressively reduce fluid losses due to leaks (excluding 3rd party damage).	Continue to target fluid losses 30% below the 2009 target (excluding 3rd party damage).	**3.7** - Fluid loss reporting (including records of leaks) to monitor fluid losses at least quarterly.	Fluid loses in 2014-15 are 30% below the 2009 levels, presented as a 12 month figure.	Underground Transmission Mains.	Target a monthly rolling average leak rate of 1956L (70% of 2009 level) or below (excluding 3rd party damage).	New target to be identified.
To use the opportunity of an open excavation to inspect and where necessary repair all joints not just the damaged ones to ensure that the risk of further leak at this point is minimised.		**3.8** - Whenever a joint bay is excavated, the pressure seals of all joints within that excavation are checked and, if practical, remade and reinforced.	Records of all repairs and checks. Wherever possible all joints within a bay are remade, however this may not be possible if the feeder is urgently required back in service. In these circumstances the joints will be put into the planned works programme.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
To better understand the fault/defect histories of the system and failure modes and to use this information to identify those sections most at risk of damage/fault.	Identify high risk sections and renew/replace.	**3.9** - Review of records for each feeder to identify those with a history of fault/damage/leaks. Prioritise feeders based on risk and develop a risk management strategy for high risk sections once within regulatory period.	Feeders to be ranked on frequency of defect events and network down time. Sections of feeders with high risk (cross waterways) identified. Risk Ranked prioritised list of feeders for replacement identified, and Summary Condition Reports for individual feeders prepared where required.	Maintenance and Replacement Planning.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans*.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .
		3.10 - Trend analysis based on records.	Volumes of cable fluid pumped are monitored, rolling averages produced and compared to target levels.	Underground Transmission Mains Environmental Services.	Reporting Quarterly for ESIP.	Reporting Quarterly for ESIP.
Aspect **4. Repairs**						
To undertake all repairs promptly and to minimise as far as practical the time taken for repairs.	All repairs for leaks >5L/day are initiated immediately leak has been located (subject to Network constraints).	**4.1** - Carry necessary material/parts etc in stock to ensure ability to immediately repair damaged cable/joints etc.	No repairs are delayed awaiting materials/parts.	Underground Transmission Mains.	Ongoing.	Ongoing.
		4.2 - A 24 hour call out repair service is provided so that early action in the event of a major leak can be initiated.	A 24 hour contact number is provided.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
		4.3 - Suitably trained staff available for the repair and maintenance of fluid filled cables	Provide ongoing specialist training for staff involved in maintenance and repair activities.	Underground Transmission Mains.	Ongoing.	Ongoing.
		4.4 - Work on fluid filled cables is only permitted by suitably qualified and experienced staff.	Experienced staff to control work on fluid filled cables.	Underground Transmission Mains.	Ongoing.	Ongoing.
To reduce the likelihood of long term contamination of soil/water, by cable fluid, arising from leaks.		**4.5** - All replacement fluid in the cables is to be of the biodegradable type (linear alkylbenzenes – LAB).	Only biodegradable cable insulating fluid is purchased.	Underground Transmission Mains.	Ongoing.	Ongoing.
Aspect **5. Organochlorine Pesticide applied to cable trenches for termite protection**						
To understand whether the risk to human health or the environment from OCPs.	To define the risk sufficiently to ensure Ausgrid is adequately managing the risk.	**5.1** - Investigations carried out by independent consultants. Update the risk assessment periodically.	Recommendations implemented.	Environmental Services.	Review if change in regulation is identified.	Review if change in regulation is identified.
To minimise the potential impact of OCPs and to avoid the need for off-site disposal of OCP contaminated soil excavated during repairs.	The risks of OCP on people, property and Ausgrid infrastructure is minimised.	**5.2** - Ceased use of OCP in 1980.	No new OCP applied to soil.	Underground Transmission Mains.	Ongoing.	Ongoing.
		5.3 - The soil removed from below the slab during repairs is kept separate from all other soils and is placed back under the slab at original depths unless contaminated with cable-fluid.	OCP contaminated soil is managed in accordance with procedures during repairs.	Underground Transmission Mains.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
		5.4 - Training of staff and contractors undertaking this work.	Training undertaken every 2 years.	Underground Transmission Mains Environmental Services.	No training required.	Training undertaken every 2 years.
		5.5 - Procedures for excavating in cable trenches.	Procedures reviewed if a change in regulation is identified.	Environmental Services Underground Transmission Mains.	Review OCP handling procedures.	Ongoing review as required.
To dispose of any OCP contaminated soil or water in accordance with relevant legislation and at EPA approved facilities.	OCP contaminated soil kept separate from non-contaminated soil.	**5.6** - Works carried out in accordance with Ausgrid EG120 Waste Guidelines.	Compliance with guidelines, waste tracking documentation.	Underground Transmission Mains Environmental Services.	Complete one audit of waste disposal documentation.	Undertake auditing as required.
Aspect **6. Infrastructure**						
To eliminate the use of fluid filled cables as the preferred technology for new feeders.	All new underground transmission circuits are to be constructed using non-fluid filled cable technology.	**6.1** - XLPE is the standard technology for new underground transmission cables.	No new fluid-filled circuits are installed by Ausgrid anywhere in Ausgrid's distribution area.	Maintenance and Replacement Planning.	Ongoing.	Ongoing.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
To replace known problem joints/sections of cable and thus reduce the likelihood of further leaks.	Targeted replacement based on historical data and risk.	**6.2** - Prioritised list of replacement and refurbishment sections prepared as input to the regulatory submission.	Undertake replacement and refurbishment of problem sections and straight joints in accordance with timeframes outlined in regulatory approval.	Maintenance and Replacement Planning Underground Transmission Mains.	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .	Cable replacements to be undertaken in accordance with the *Strategic Asset Prioritisation Subtransmission Cables strategy document and relevant Area Plans* .
To remove all fluid filled cables.	Replace / retire all fluid filled cables over 20 years (2029).	**6.3** - Prioritised list of fluid feeders for Replacement prepared as input to the regulatory submission.	Regulatory submission to include funding for next regulatory period. Transmission Mains Replacement Plan includes replacing / retiring all fluid filled cables by 2030.	Maintenance and Replacement Planning System Planning and Regulation.	*Strategic Asset Prioritisation Sub-transmission Cables* prepared and approved for submission to AER for regulatory submission.	Pending outcome of regulatory submission.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2014-2015	Target Post 2015
Aspect **7. Benchmarking**						
To identify reliable technology which is able to locate leaks at rates lower than 5L/day.	Technology able to accurately locate leaks at a rate lower than 5L/day.	**7.1** - Benchmarking with other utilities	Proven technologies are adopted as soon as practical.	All relevant sections as appropriate.	Ongoing	Ongoing
To be consistent with similar networks around the world in reducing leak rates on a per km basis.	Achieve the lowest leak rate for comparable transmission systems around the world.	**7.2** - Benchmark leak rates per km cable with other distributors around the world.	Prepare benchmarking reports as required to compare Ausgrid leak rates to comparable transmission systems worldwide.	Primary Systems transmission and distribution mains engineering	Review information from CIGRE conference as appropriate. Input to the Fluid Filled Cables Working Group as appropriate.	Pending outcome from review.
		7.3 - Implement this management strategy including this action plan.	Action Plan identifies improvements. Action Plan updated annually.	Environmental Services.	Consultation with all relevant Sections and update of the Strategy accordingly. Publishing Strategy on the Environmental Index and preparation of ESIP reporting.	Consultation with all relevant Sections and update of the Strategy accordingly. Publishing Strategy on the Environmental Index and preparation of ESIP reporting.

8 References

2006 Environ Australia (2006), Review of the 1997 Dames and Moore Report

2010 (Coffey Environments) High Voltage Cable Trenches Organochlorine Pesticide Review

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Dames and Moore (1997) 'Stage 2 Environmental Assessment High Voltage Cable Trenches'. Dated 8th January 1997

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NSW DECC (2008), Waste Classification Guidelines, Part 1: Classifying Waste

Parsons Brinkerhoff (2007) Environmental Risk Assessment for the Removal of Submarine Cables from Pyrmont to Rozelle Bay

Protection of the Environment Operations Act 1997.

Appendix A – Fluid Filled Cable Design and Installation

Oil Filled Cable Design and Installation

Cables

As shown in **Figure 8-1**, the basic single-core design includes a hollow duct through the centre for easy passage of fluid, copper or aluminium conductors around the duct, paper insulation and a metallic sheath to keep the fluid inside. An outer serving of PVC or other tough plastic is used to provide a protective barrier to protect the metal sheath from corrosion. In these types of cable, the paper insulation is impregnated with a thin fluid. When heated the expanding fluid can flow through the central duct to fluid expansion tanks which receive the fluid under increasing pressure, conversely when the load is reduced and cooling occurs, the fluid is forced back into the cable.

Fluid expansion tanks consist of cylindrical steel containers which contain gas-filled compressible cells. The cells are soldered airtight and all remaining space in the container is filled with oil. Depending on the expansion of the fluid due to load variations and seasonal temperatures of the ground, the vessels act to ensure the operating pressure is maintained within desired limits. Cables are supplied from the manufacturer with the fluid already in the cable and additional fluid is only put into the cables if a leak occurs. Otherwise it is a closed system and no additional fluid is required once the cable is installed.

For very long fluid-filled cable runs or where great differences in level occur, sealed stop joints are fitted to divide the static pressures and also to allow the connection of expansion vessels along the cable run. This design results in a series of locked sections which with respect to fluid content are completely independent of one another. For long cable runs, depending upon height differentials, the number of locked sections is reduced compared to those required for a level run.

The operating pressure of an oil-filled cable is normally between 1.5 and 6 bar (150 – 600 kiloPascals). Since the strength of the lead sheath only permits low internal pressures, these cables have a pressure protection tape in the form of a helix wound directly over the lead. In 3-core oil-filled cables this tape is of steel but in single-core cables it is of nonmagnetic material. For cables with aluminium sheath the tape is omitted.

Figure 8-1 Cross Section of Section Core Cable

Installation

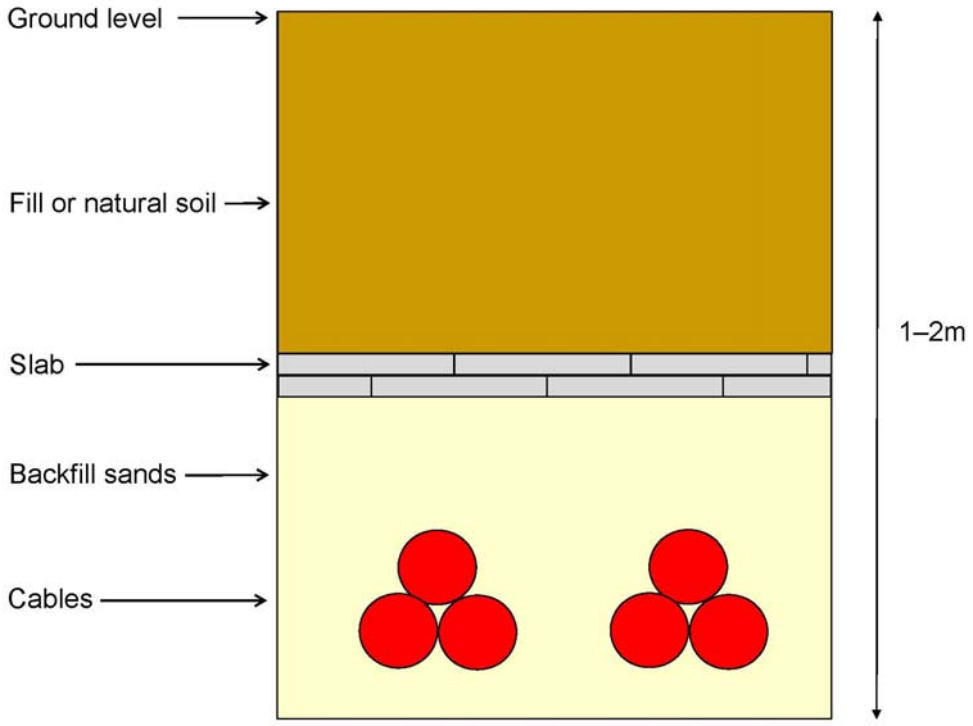
Most cables are located in road reserves (under the carriageway) at depth of 1 - 2 metres and are surrounded by sand, clay, grout, or a concrete mix. A protective concrete slab (or polymeric cover) is buried 0.1 - 0.2 m above the cables along the entire route.

Figure 8-2 illustrates a typical cable trench. Trenches may contain between 1 and 6 cables. Once installed the cables are energised and put into operation. They are then only disturbed if a fault arises.

Cables were supplied from the manufacturer with the fluid already in the cable and additional fluid is only put into the cables if a leak occurs. Otherwise it is a closed system and no additional fluid is required once the cable is installed. Originally the fluid used in the cable was a highly refined mineral oil, however a blend of C11/C12 linear alkylbenzenes is now used. See **APPENDIX 2** for details on the fluid.

Within the Ausgrid network, the cables are mostly single core although there is a small percentage of 3-core cables.

Figure 8-2 Typical Transmission Cable Trench Arrangement



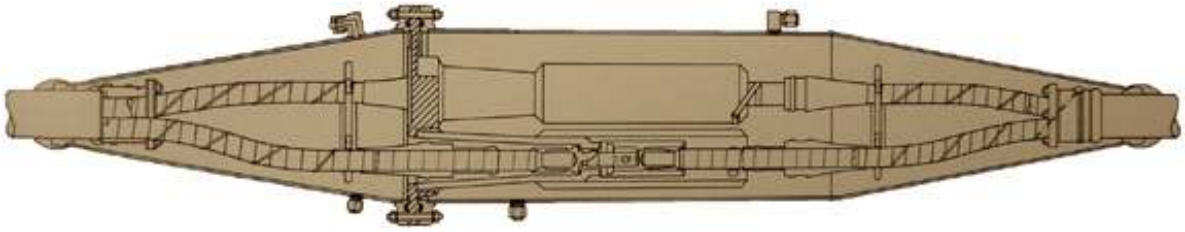
Joint Designs

Three different types of joints are used in the transmission network. The straight joint, **Figure 8-3**, is used for direct connection of two cable lengths to each other and is available in different designs. The trifurcating joint is used to joint a three-core cable to a single-core cable. (BICC Cables, 1998) In Ausgrid's network, the trifurcating joint is mainly used when connecting a submarine cable to a land cable.

Figure 8-3 Straight joint (BICC Cables, 1961)

The stop joint, **Figure 8-4**, makes a barrier to prevent fluid flow across the joint and provides a fluid feed point. This is used in long circuits, and when the cable route is undulating. In some cases the stop joint is designed as a trifurcating joint to provide a hydraulic barrier between a three-core and a single-core cable. The third joint type is the transition joint used when connecting a fluid-filled cable to a solid. Like the stop joint, the transition joint provides an impermeable barrier between the two adjacent lengths of cable. (BICC Cables, 1998).

Figure 8-4 Stop joint (BICC Cables, 1961)



All fluid-filled cable joints are enclosed with an outer protective metal box, which is, for insulation, filled with bitumen. As a feeder consists of three phases (cables) each joint bay contains three joints.

Installation

Joints are made and then a fibreglass “coffin” is placed around the joint. This coffin is filled with a bituminous material which sets and provides protection for the joint. The top is then put onto the “coffin” and the trench backfilled.

Appendix B – Linear Alkylbenzene Fluids

Linear Alkylbenzene Fluids

Alkylbenzene fluids have replaced mineral oils as the fluid of choice for insulation in fluid-filled cables. They are used as they are highly stable under electrical stress and they have a considerably enhanced ability to chemically absorb hydrogen gas, a gas which may be produced during electrical discharge activity in a hydrocarbon liquid. The superior gas absorbency of alkylbenzene has been measured at >20mm3.min-1 whereas mineral oil is measured at >2mm3.min-1.

Linear alkylbenzenes used for this purpose are clear, colourless, odourless, water-like liquids. They are readily biodegradable. The technical properties of the insulating fluid used in cables are shown in **Table 8-1** below:

Table 8-1 Technical Properties of Cable Insulating Fluids

Properties	Mineral Oil	Alkylbenzene
Viscosity, 20°C/mm3.s-1	5	<6
Flash point, open/°C	120	140
Dissipation Factor @ 90°C, tan δ	0.002	0.001
Volume Resistivity @ 90°C/GΩ.m	>50	>1000
Breakdown stress /kV.mm-1	30	40
Biodegradability BOD/COD %	11	80

Ref M.A Simmons Insulating Liquids used in Fluid Filled Cables, 1996, The Institution of Electrical Engineers

The potential contamination of the surrounding soil by the insulating fluid is an important aspect of environmental management and assessment. The release of mineral oil has the potential to cause contamination of the surrounding soil profile. An important preventative measure to minimise the threat of environmental damage is the ability of the insulating fluid to possess biologically degradable properties. This is another advantage to the use of alkylbenzene as an insulating compound for fluid filled cables. It has been documented that the biodegradability of alkylbenzene is 80% (BOD/COD) in comparison with mineral oils at 11% (BOD/COD) – a percentage above sixty is regarded as highly biologically degradable. The fluid used meets the requirements of OECD guideline 301D for ready biodegradability.

The biodegradability of alkylbenzene has been studied in recent times under aerobic and anaerobic conditions. Reports have been documented where 10 micrograms of alkylbenzene in an aerobic environment was found to have a half-life ranging from three to four days. Anaerobic biodegradation of alkylbenzene has not been examined as thoroughly, however, results based on recent findings with related compounds suggest that alkylbenzene is susceptible to microbial attack in anoxic environments.

Appendix C – Linear Alkylbenzene MSDS

Appendix D – Leak Location Techniques

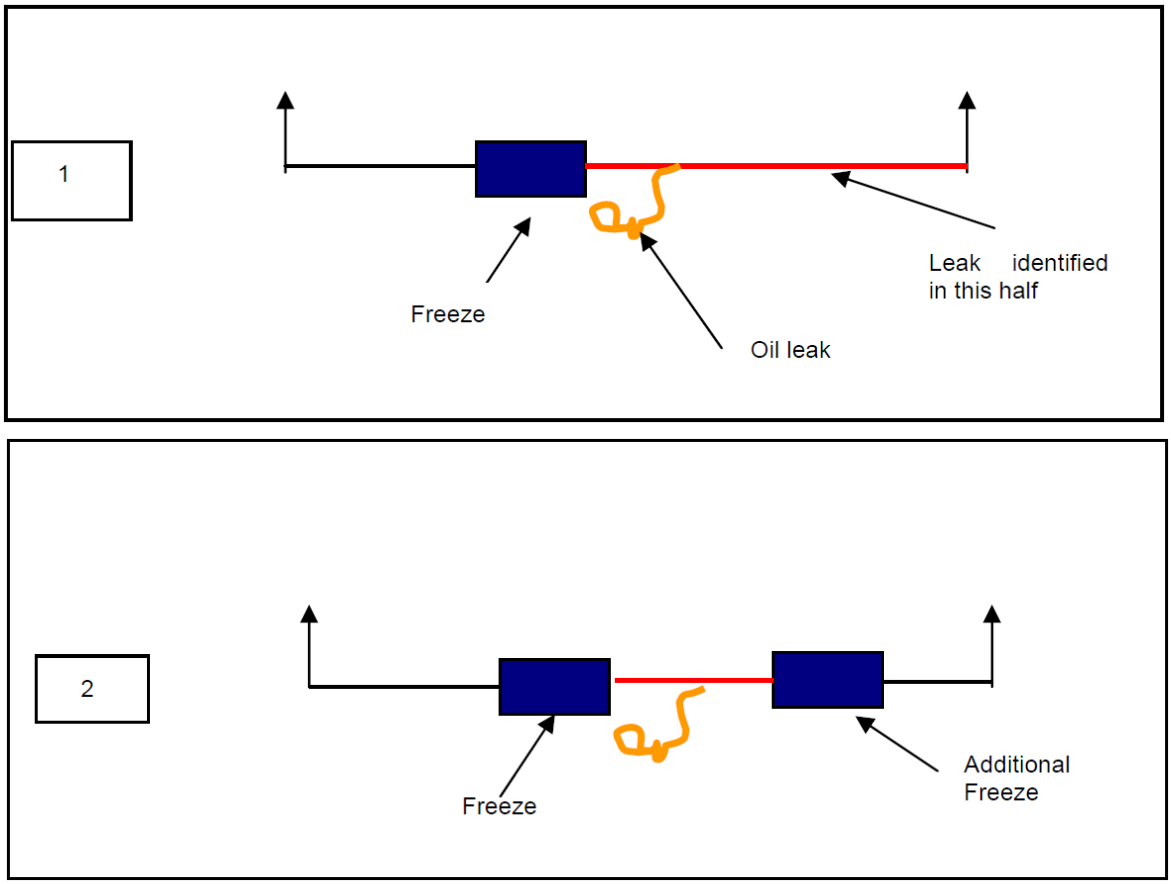
Leak Location Techniques

Once a fluid leak has been discovered a digital manometer is used to detect the phase that the leak has occurred on and the leak rate. The actual leak location is found using either flow boards or by freezing sections of the cable.

Freezing

Using liquid nitrogen, the leaking section of the cable is frozen in the middle so that no fluid can flow from one section to the other (1). Only one half will continue to leak. Another freeze is then placed in the middle of the half (2) that has been identified as the leaking half, see **Figure 8-5** below. This process is then repeated until the leak is found. This may take up to two weeks, involve more than one excavation and thus generate a greater amount of waste and community disruption. This technique also places greater stress on the cable.

Figure 8-5 Cable Freezing Methodology



Flow Boards

Flow boards determine the position of the leak by measuring the rate of flow. Three flow boards are required and are connected as shown in **Figure 8-6**. The leaking phase is connected to a healthy phase and both phases are connected to the pressure tank.

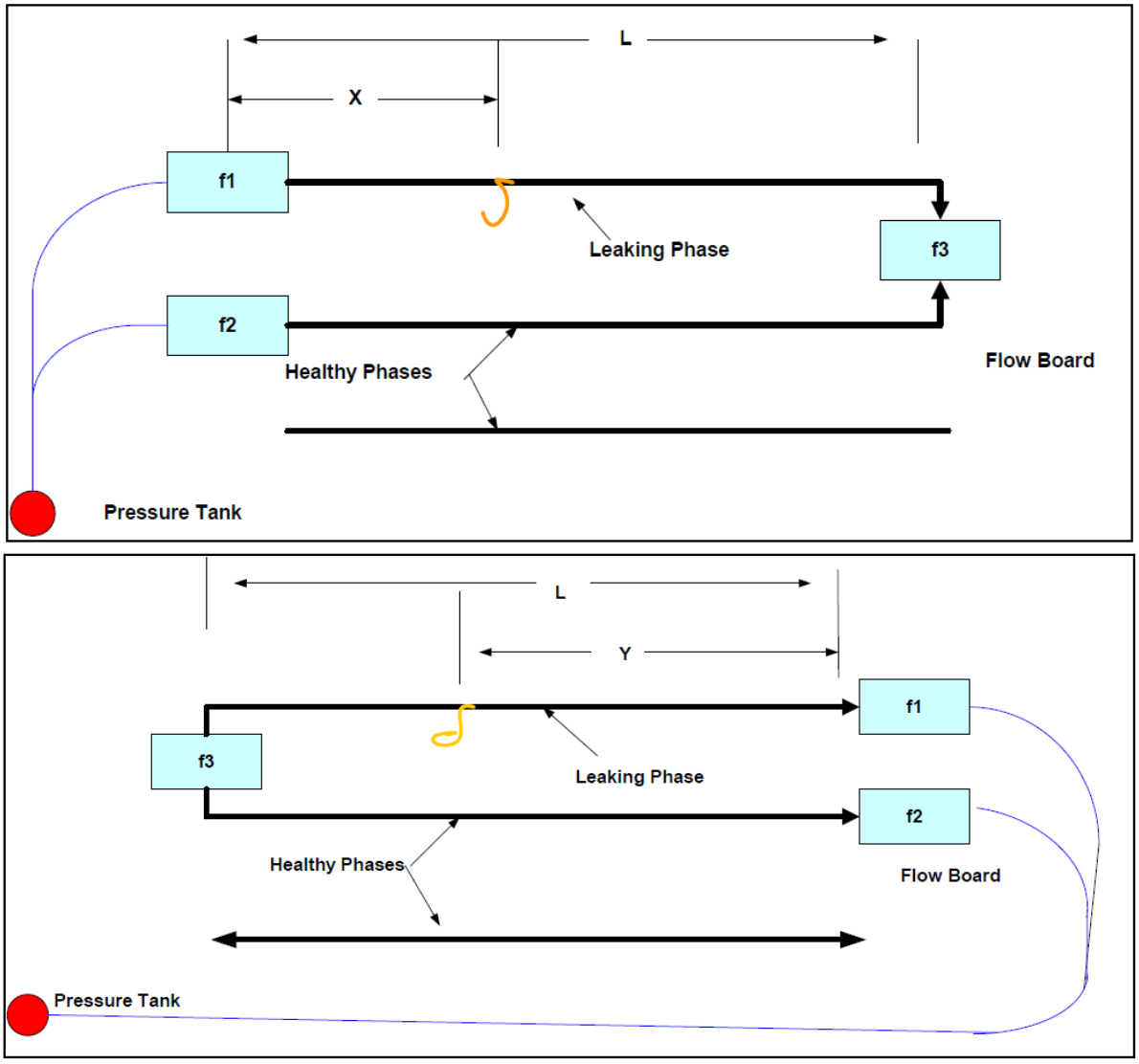
The flows from the tank to each phase (f1 and f2) and between the phases (f3) are used to determine a ratio between the distance from the leak to the pressure tank (x) and the distance of the phase to the next stop joint. The formula is as follows:

$(x/L) = 2\ f3 / (f2 – f1 + 2f3)$

The distance L is known therefore x can be can be estimated. To verify the result the phases and flow boards are rearranged and connected as shown in **Figure 8-6** below to determine (y/L) using the same formula. If the estimates are correct (x/L) and (y/L) will equal 1.

Some authorities such as EA Technology in UK appear to have refined this technique, adding computerised monitoring to improve calculation speed.

Figure 8-6 Flow Board Methodolgy



Sniffer gases

The method is based on chemicals called perflurocarbon tracers (PFTs) which are man-made gases that can be easily detected using special sensors. Because PFTs are inert they can be safely added to the insulating fluid used in the cables. If there is a leak, the trace amounts of PFTs in the dielectric fluid can be detected in aboveground air with sensors called dual trap analysers (DTAs). Once the location has been narrowed down tiny boreholes are made to pinpoint the location to within a few metres.

Comparison

Generally flow boards are the preferred method as results can be achieved more quickly at lower cost and without potential damage to the cable. Flow boards can provide an identifiable result in an eight-hour period whereas a series of freezes on a section of cable may take 1-2 weeks of work.

However flow boards are not always the best solution as accuracy is around 5% which could result in a fifty-metre deviation in a 1-km fluid section. Sections of cable involving sealing ends are susceptible to changes in temperature creating thermal flows that distort the test. Rain and vibration from heavy vehicles also causes further distortion. If more than one leak exists the result will also be inaccurate.

Freezing the cable does allow smaller leaks to be located. However freezing and unfreezing a cable puts it under considerable strain and can deteriorate the cable and could result in a greater number of leaks.

Ausgrid have used (and still do use) tracer gases for fault location on gas pressure cables. However, our experience to date has been mixed. Gas leaks in the metal sheath can let gas escape, but it sometimes travels along the cable beneath the serving, possibly for hundreds of metres, until it finds a weakness in the cable sheath through which it can escape to the air and be detected.

Currently Ausgrid uses the flow board method for locating leaks.

Appendix E – Cable Protection From Termites

Cable Protection From Termites

“Termites ... are capable of destroying plasticised PVC and certain other materials used in the manufacture of electric cables” [4]. Underground sub-transmission cables in areas of high termite activity are susceptible to termite attack and protection may be required.

The use of Aldrin and Dieldrin (and other environmentally hazardous pesticides) is banned and alternative protection methods must be used. References [4] and [7] present a number of these alternative methods including pesticides, providing a smooth surface and mechanical protection.

In considering pesticides it is very important to research their impact on the environment before they are used. A new method of applying cypermethrin, a pesticide that offers termite protection, is to incorporate the pesticide into the PVC or MDPE sheath of the cable [7]. Experiments [7] show that cypermethrin mixed with MDPE at concentrations higher than 0.12% offers good protection against termites. When PVC was used, on the other hand, the cable still suffered a slight attack. As cypermethrin is not soluble in water, it will stay locked in the cable sheath and hence this method is considered environmentally safe during operation. However, there are unresolved environmental concerns during production and disposal. For this reason, and the increasing legislative restrictions placed on pesticides, this method is not recommended.

The use of a sufficiently smooth surface (e.g. nylon grade 12 or better) prevents termites from getting a hold with their mandibles and thus protects the cable. Materials available are nylon, brass, copper and high density polyethylene (HDPE). Surface smoothness must be maintained through the installation process of the cable in order to ensure adequate protection. A sacrificial layer of PVC is usually applied over the nylon sheath to ensure protection against damage during installation [8].

Another form of protection involves providing sufficient mechanical protection to prevent termites penetrating the cable despite being able to get a hold with their mandibles. CSIRO test “have shown that High Density Polyethylene and polypropylene offer resistance to termite attack” [4] as they “have the advantage over PVC in possessing superior hardness and abrasion resistance. However “it is recognised that these two materials are not suitable for all cable types and functions”. Another option is wrapping a stainless steel mesh around the cable. The square holes in the mesh are small enough that termites cannot get their hard heads through. This method has been trialed on poles in Ausgrid. The report compiled on the trial results [9] indicated that the “Termi Mesh stocking was found to be in sound order for the depth of the excavation.” It also stated that “Termi Mesh is now made from 316 Marine Grade (steel) exclusively” and that “tests in USA have proved that 316 grade of stainless steel does not corrode in boggy ground with a high salt content”. The application of Termi Mesh may be able to be extended to protecting underground cables against termites.

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[3] John Gerozisis and Phillip Hadlington, Urban Pest Control in Australia, University of New South Wales Press Ltd, 3rd revised edition 1995.

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[5] Report by Dames & Moore, 6 June 1997, Stage 2 Environmental Assessment High Voltage Cable Trenches.

[7] Dr R. Porro et al., 15 July 1996, Termite Protection of Underground Distribution and Transmission Cables.

[8] MM cables.

[9] G. Motum, 9 April 1996, Stainless Steel ‘TERMI MESH’ Stocking for Termite Protection of Timber Poles.

Environmental Management Strategy

EMS 350 Oil Filled Equipment

Version 6, May 2013

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Contents

Tables

Glossary

AER	Australian Energy Regulator
AG	Ausgrid
cm	Centimetre
CIGRE	CIGRE is an international organisation dedicated to the identification and the development of solutions to technical issues in the power supply sector.
CO_2	Carbon Dioxide
DA	Development Application
DG	Ausgrid's distribution guideline
DGA	Dissolved Gas Analysis
EIP	Environmental Improvement Plan
EGOWS	Enhanced Gravity Oil Water Separator
EMS	Environmental Management Strategy
ENA	Energy Networks Association
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services.
EPA	Environmental Protection Agency
EP&A Act	*Environmental Planning and Assessment Act 1979*
ISO	International Standards Organisation
kg	kilogram
kV	Kilovolt
L	Litre
m	Metre
MSDS	Material Safety Data Sheet
MVA	mega Volt Amps
OEH	Office of Environment and Heritage
OH&S	Occupational Health and Safety
PCBs	Polychlorinated Biphenyls
pH	A measure of the acidity or alkalinity of a solution
POEO Act	*Protection of the Environment Operations Act 1997*
ppm	Parts Per Million
PPS	Parallel Plate Separator
PT	Pole Top Transformer
SF_6	Sulphur Hexafluoride
STS	Subtransmission Substation
ZS	Zone Substation

Executive summary

Ausgrid is committed to the community, safety and meeting the needs of a growing energy market by effectively maintaining our assets (in accordance with the AER submission) and finding better ways to plan for our future energy demands.

Ausgrid operates over 230 sub-transmission and zone substations that typically contain 3 large oil filled power transformers with between 5,000 and 50,000L of oil and other smaller oil filled equipment including current transformers, voltage transformers, and switchgear. There are also over 30,000 distribution substations that typically contain transformers with between 100L to 900L of oil.

Transformers contain oil for electrical insulation and cooling purposes. Oil can be lost from transformers by either minor leakage during operation or as a result of failure of the transformer.

Ausgrid has an Oil Containment Program which focuses on mitigating the environmental risk across all existing and new sites. This program is managed on a risk-based approach particularly aimed at reducing risk to the environment against a major failure.

Transformers commissioned before 1997 may also contain polychlorinated biphenyls.

The management of oil filled equipment is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from containment installation, containment maintenance, equipment maintenance and other improvement projects outlined in this strategy.

Key measures include:

- The use of risk assessments for managing and prioritising risks associated with oil filled equipment
- The use of EGOWS or PPS systems for all new sub-transmission and zone substations sites as a minimum standard
- A commitment to upgrade all zone substations sites with no oil containment to sites with PPS systems within 5 years at an estimated cost of $11M (2009-14 regulatory period)
- A commitment to upgrade all zone substations sites with inadequate bunds with flame traps, new gravel and increased bund size within 5 years at an estimated cost of $15M (2009-14 regulatory period)
- A commitment to upgrade all sub-transmission substations with inadequate brick bunding, oil water separators and damaged pit and pipework by the end of 2015 at an estimated cost of $11M
- The removal of all Scheduled PCBs from existing sub-transmission and zone substation transformers
- A commitment to phase out and manage all other PCBs on the network in accordance with Ausgrid's PCB licence
- Ongoing maintenance, monitoring of equipment and containment facilities
- Training and awareness in spill response and preparedness
- A commitment to adopt proven technologies that improve performance as soon as practicable
- A commitment to report against, review and update this plan on an annual basis.

1 Scope

This management strategy outlines the management of environmental issues associated with oil loss from Ausgrid's oil filled equipment at sub-transmission, zone and distribution substations.

The management plan is not an Asset Management Plan for oil filled equipment.

The management does not address typical handling requirements for daily oil handling.

2 Background

Throughout its distribution area, Ausgrid (AG) has an extensive network of major and minor substations. Major substations refer to sub-transmission and zone substations. Minor substations refer to distribution substations which include pole top transformers, chamber type substations and street kiosks.

Ausgrid has approximately 34,000,000 L of oil distributed throughout the network in transformers, switchgear and in storage.

Transformers contain oil for electrical insulation and cooling purposes. Transformers are designed to be closed systems, such that the insulation oil is contained within the casing and does not enter the surrounding environment. However, there is potential for loss of oil via minor leaks or major failure.

There are over 230 sub-transmission and zone substations that typically contain 3 large oil filled power transformers with between 5,000 and 50,000L of oil and other smaller oil filled equipment including current transformers, voltage transformers, and switchgear.

There are also over 30,000 distribution transformers that typically contain between 100L to 900L of oil.

The management of oil filled equipment is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from containment installation, containment maintenance, equipment maintenance and other improvement projects outlined in this strategy.

3 Issues

3.1 Substations

Ausgrid has a significant volume of oil filled equipment. The majority of oil is located in 594[1] transformers which are located in over 230 sub-transmission and zone substations and 33,200 transformers which are located in over 30,000 distribution substations.

Other equipment contains minor amounts of oil - such as current transformers, voltage transformers, and oil filled switches. This equipment generally contains between 200 and 400L of oil per unit. Newer models of this equipment with alternatives to oil are now being utilised across the network. This is greatly reducing the oil volume and number of oil filled assets in service.

Appendix C provides details of the types and number of substations including sizes and estimated quantities of oil.

3.2 Transformer Oil

Insulating oil is an extract of petroleum and is therefore a pure hydrocarbon mineral oil which, when refined is relatively stable in storage and use. It is used in transformers as an insulating medium and cooling (heat transfer) medium and in oil circuit breakers as an insulating medium and arc quenching medium.

[1] Refer to Appendix C

Transformer oils used by Ausgrid contain additives that enhance their physical and chemical properties – eg. inhibitors, and additives that retards oxidation are present in most transformer oils. The oil used in most newer transformers is also passivated. Neither of these additives alters the flashpoint temperature.

Transformers commissioned between before 1997 may contain polychlorinated biphenyls (PCBs). Ausgrid is managing equipment containing PCBs in accordance with the National PCB Management Plan and the NSW Environmentally Hazardous Chemicals Act, 1985.

The essential properties and characteristics of insulating oil are covered in the Australian Standard AS 1767-1975 'Insulating Oil for Transformers and Switchgear'. The detailed methods of handling and testing insulating oil are covered in Australian Standard AS 1883-1976 'Guide to Maintenance and Supervision of Insulating Oils in Service'.

Transformer oil is classed as a combustible liquid by Australian Standard 1940-2004: The Storage and Handling of Flammable and Combustible Liquids. Its flashpoint varies between 140° and 148°C classifying it as a class C1 Combustible liquid. The Standard classifies Flammable Liquids as those with a flashpoint temperature of less than 60.5°C (closed cup test), whilst combustible liquids are identified as being 'any liquid, other than a flammable liquid, that has a flashpoint, that is less than its boiling point'.

3.2.1 Alternatives to mineral oil filled transformers

Dry type transformers

Dry type transformers do not contain oil, however, they are not considered a suitable alternative for large oil filled transformers. Dry Type Zone Transformers are typically limited to 30MVA capacity and prohibitively expensive. Dry type transformers can add more than $1M to the cost of a new zone transformer and are not available in all the sizes required by Ausgrid. They also result in compromises like much larger sizes, reduced output range, excessive noise, increased level of electromagnetic leakage and increased maintenance requirements.

Sulphur Hexafluoride (SF_6)

SF6 is used mainly as an insulator in modern electrical switchgear, but can also be used in a variety of equipment including transformers. Although SF_6's chemical and physical properties make it seem attractive for the applications above, SF_6 is one of the most potent "Greenhouse" gases with a global warming potential 23,900 times greater than that of carbon dioxide.

The notional SF_6 greenhouse impact costs over the operational life of the equipment as follows:-

Notional cost over n years =

$$23\,900 \times \sum_{i=1}^{n} \text{[Leakage of } SF_6 \text{ in year } i\text{]} \times \text{[Carbon credit rate in year } i\text{]}$$

The notional cost is based on the following assumptions:

- SF_6/CO_2 Greenhouse Index — 23 900
- Leakage rate yrs 1-5 — 0% by total volume
- Leakage rate yrs 6-20 — 0.5% by total volume
- Leakage rate yrs 21-35 — 1% by total volume

In accordance with the Ozone Protection and Synthetic Greenhouse Management Act 1989, from 1 July 2012 an equivalent carbon price will be applied to certain synthetic greenhouse gases including SF_6 (and equipment or products which contain it). The equivalent carbon price will be in the form of a levy which will initially be set and then adjusted annually for three years. The proposed prices are:

- $23.00 / tonne in 2012/2013 financial year
- $24.15 / tonne in 2013/2014 financial year
- $25.40 / tonne in 2014/2015 financial year

- After 2015 the carbon price will transition to a flexible price under an emissions trading scheme, with the price being determined by the market.

SF_6 transformers are available at a large price premium. These transformers are not locally made and must be imported. Considering the cost, availability and greenhouse gas implications, SF_6 transformers generally are not considered a practical or appropriate alternative to oil filled transformers.

Alternatives to mineral oil (transformer fluids)

A number of alternative transformer fluids exist that can be used instead of petroleum-based mineral oil. These fluids have electrical properties that make them suitable for use in some transformers but with improved biodegradability rates. Furthermore, these fluids generally have a higher fire point and flash point, which significantly reduces the risk of a fire. The price of these fluids varies, but they are generally more expensive than mineral oil.

Furthermore these fluids have many different properties to mineral oil eg viscosity, ability to transfer heat, affinity to moisture; as well as some differences in electrical properties. Some of these fluids are also prone to rapid deterioration in the presence of oxygen, so can only be used in sealed transformers. Different processes and support infrastructure may also be required for handling and processing these fluids to prevent mixing with traditional mineral oil and prevent exposure to oxygen.

In some limited situations these alternative fluids have been used to reduce fire risk or for the technical and environmental benefits. New transformers can be designed to be suitable for use with one of these alternative fluids, and retro filling of existing transformers may be possible after careful assessment by a transformer specialist.

The requirements for storage and use of these fluids is the same as for mineral oil eg transformer bunds are still required. However, biodegradable oils may offer some benefits in clean-up and remediation and potentially provide reduced risk in environmentally sensitive areas, where a spill would pose a threat to marine life.

Polychlorinated Biphenyls

Ausgrid used polychlorinated biphenyls (PCBs) in a concentrated form as a dielectric in some small volume high voltage electrical equipment since the 1920s. The practices at the time, combined with the belief the PCBs were not harmful, lead to cross contamination, resulting in large amounts of mineral insulating oil becoming contaminated.

In the late 1970's, the purchase of equipment containing PCBs ceased.

In 1989 Sydney Electricity commenced a replacement program for equipment containing pure PCBs[2]. This program was temporarily suspended due to the commonwealth government banning the export of hazardous wastes.

In 1997 Ausgrid commenced a replacement program for all equipment containing Scheduled PCBs as part of a management plan for all equipment containing PCBs.

Ausgrid manages PCBs in accordance with the, "Polychlorinated Biphenyl Wastes (PCB) Chemical Control Order 1997" and a licence issued by the EPA. The management of PCBs is covered by another strategy, *EMS 410 – PCB Management Strategy*.

Ausgrid has completed the removal of all Scheduled PCBs from all sub-transmission and zone substation transformers.

3.3 Oil Loss from Transformers

Oil can be lost from transformers by minor leakage or as a result of failure of the transformer.

[2] Pure PCBs are defined as liquid dielectrics, which typically contain a mixture of 70% PCB and 30% thinner, i.e. 700,000mg/kg of PCB.

The likelihood of rupture is extremely small; transformers are designed to operate under high voltages and currents in outdoor locations. The estimated frequency of major leaks (eg due to lightning strike, for Ausgrid's transformers is one per 10-20 years for sub-transmission and zone transformers and one per year for distribution transformers).

More information about transformer failure modes is given in **Appendix B** Major Transformer Failure Information.

Most transformer failures result from the failure of the ancillary components (ie tap changes, bushings, cable boxes and link boxes) rather than from within the tank itself.

Recommendations to minimise the frequency and consequence of transformer failures include:

- Testing of the insulation oil to detect defects (such as Dissolved Gas Analysis (DGA))
- Ensuring that maintenance is carried out correctly on tap changers.
- Ensuring that bushings are tested regularly and replaced as required. Note: Ausgrid has a proactive 132kV Substation bushing replacement program.
- Ensuring that cable boxes are inspected regularly and any problems corrected.
- Ensuring that correct procedures are used when working in link boxes to minimise risk of contamination of the oil.

Minor leakage from transformers due to aging of gasket materials is difficult to completely prevent.

Minor leakage does not constitute a failure of the transformer and occur as transformer components naturally age during operation. The parts of the transformer that are prone to leaks are the main tank lid gasket, radiators, valves, and tap changer gaskets.

3.3.1 Alternatives to Gaskets

Welding joints and minimising the number of hatches on a new transformer will reduce leaks. However, this needs to be balanced with issues later in the transformers life when it becomes necessary to complete inspection and maintenance tasks.

The recent and ongoing capital program has replaced a significant percentage of older transformers. This has consequently reduced the occurrence of leaks. In extreme cases welding of the transformer lids has also been completed on occasions where specifics of the transformer allowed.

3.4 Ausgrid's Oil Containment Systems

The purpose of an oil containment system is primarily to mitigate risk to the environment against a major failure. When designed, constructed and maintained correctly, the oil containment system mitigates risk exposure in three ways:

1. In major failures that involve fire it reduces the risk of prolonged fire (hence fire spread) by providing a quick draining route for oil, eliminating the fuel source.
2. In major failure it prevents large amounts of oil from entering stormwater drains and waterways by containing the full oil volume of the largest transformer on site.
3. It reduces the risk of oil mixed with water escaping the site when minor transformer leaks occur during normal operation by providing oil separation.

3.4.1 Zone and STS Substations

Oil containment is generally of five different types, each operating with a performance level depending on when the separator was installed. The typical performance of these is summarised in **Table 1**.

Table 1 Ausgrid Separator Systems (correct as of Jan 2013)

O/W Water Separators	Total in operation	Typical output performance
Enhanced Gravity Oil Water Separator (EGOWS)	70	<10mg/l
Plate Separators (PPS)	49	<10mg/l
Single Stage Separators, 2 Stage Separators	64	100mg/l
3 Stage Separators	13	100mg/l
None	14*	NA

Note: The limit of 10mg/l for the PPS technology is currently considered the lowest practicable working limit primarily due to emulsification of oil.

Note: Refer to **Section 4.3** for information on Ausgrid's Oil Containment Program

Note: Sites assessed within the Oil Containment Model with greater than 1000L oil filled equipment.

* Sites identified for decommissioning have been excluded from Ausgrid's Oil Containment Program. Alternate solutions will be investigated for these sites.

A summary of typical Ausgrid systems performances are as follows:

- Single stage separators (both circular and rectangular construction): During operation, oil and water discharge is not expected to achieve better than 100ppm. This is because a continuous flow system does not allow sufficient storage time to allow full oil & water separation. As a result, during rainfall, the system allows unseparated oil to be discharged, potentially even in minor rainfall events.
- Three stage separators: These work in much the same way as the single stage separator however, they may provide slightly longer travel paths and hence longer storage and separation times. Discharge is not expected to achieve results better than 100ppm (as they are generally similar in design to the American Petroleum Industry (API) tank criteria which achieves a discharge criteria of 100ppm).
- Enhanced Gravity Oil Water Separator (EGOWS): These are not a continuous flow system and hence the degree of separation is much greater, generally achieving less than 10 ppm for oils and greases. A residence time is achieved which is sufficient to attain these low levels of oil in the discharge. In major storm events, continuous flow could occur in the tank. This is considered statistically acceptable as for the majority of the time as the tank is not under continuous flow. See **section 4.3** for more information.
- Plate separator systems: Plate separators are capable of achieving discharge rates of up to 10 ppm for oils and greases. This oil containment system relies on containing oil within the bund during a major failure. See **section 4.3** for more information.

Sydney Water and similar water authorities do not generally permit stormwater to be discharged to sewer.

Water from the separators usually discharges on to the ground, eventually flowing to stormwater drainage. Oil separated from the discharge is contained in oil storage compartment, tank or drum (depending on the type of separator) for regular removal and disposal.

Each containment system must be designed to provide environmental protection given other site and installation constraints.

Ausgrid has assessed various oil separation facilities for their suitability. This review is summarised in **Appendix A**.

3.4.2 Distribution Substations

Distribution substations (kiosk and chamber style) designs incorporate basic containment options such as concrete tub style bases. Bunding for these transformers is designed to meet the requirements of AS2067, requiring oil containment for high voltage electrical equipment containing more than 500L.

The design is capable of containing the total volume of oil held within the equipment. This requirement is a standard requirement for new style distribution substations. Older style distribution substations with no oil containment are upgraded as part of Ausgrid's replacement programme or retired at their decommissioning.

Where no oil containment system is used (volumes under AS2067), for example, pole top distribution transformers, the immediate response to an incident must be safety and then containment of spill.

3.4.3 Deluge Systems

Critical indoor substations are protected by automatic file sprinklers systems which are designed to discharge water (50-90 L/s) during a transformer fire. The containment systems at CBD substations do not have sufficient capacity to contain this water for more than a few minutes. A progressive upgrade of CBD substations is addressing issues associated with containment of water from the automatic fire systems.

New substations that incorporate a deluge system are generally designed to hold 90mins of deluge water.

3.4.4 Stormwater Inflow

The catchment size is a critical factor in reducing the physical requirements and/or improving the performance of any separator system.

One option for reducing the catchment size is the installation of roofed areas. Roofs can be installed over the transformers and possibly the transformer roadway, drainage lines and an oil containment tank to retain oil lost through normal operation and through major failure. Unfortunately, this option is not available in most cases as there are live electrical busbars and equipment located above the transformers.

4 Management Strategies

4.1 Risk Assessment

Ausgrid has adopted a risk-based approach to oil containment.

The purpose of an oil containment system is to mitigate risk to the environment against a major failure and provide a safer work area for operation and maintenance on electrical equipment. When designed, constructed and maintained correctly, the oil containment system mitigates risk exposure in three ways:

- In major failures involving a fire it reduces the risk of prolonged fire (hence fire spread) by providing a quick draining route for oil, minimising the fuel source.
- In major failure, it prevents large amounts of oil from entering stormwater drains or waterways by containing the full oil volume of the largest transformer on site.
- It reduces the risk of oil mixed with water escaping the site when transformers have minor leaks during normal operation by providing oil separation.

4.2 Siting Selection

The location of oil filled equipment has an influence on the risks associated with the facility.

In conjunction with other criteria including an environmental impact assessment in accordance with the *Environmental Planning and Assessment Act 1979*, environmental risk assessments will consider and address:

- Site conditions such as topography, usage of adjoining areas, or the risk of natural disasters, e.g. flood, earthquake, lightning strikes;
- Heat, corrosion, or environmental damage by the liquid being handled;
- Design of plant, equipment, and operating methods, so as to minimize fire and accident risks;
- Specific design for emergencies particularly fire fighting facilities;
- Safe access to and egress from all working locations;
- Avoidance of ignition sources (exemptions apply in AS1940 for equipment in service);
- Spill control measures to avoid contamination of soil and water;
- Location of protected places, such as dwellings, place of worship, public building, schools or colleges, a factory, workshop, office, store, warehouse, shop, a ship lying at permanent berthing facilities, etc;
- Location of drains, waterways, etc;
- Location of protected fauna and flora.

4.3 Ausgrid's Oil Containment Program

Ausgrid has an Oil Containment Program which focused on mitigating the environmental risk at both new and old sub-transmission and zone substations sites.

4.3.1 New sites

The type of system usually installed at Ausgrid's new sub-transmission and zone substations are Parallel Plate Separators (PPS) or the Enhanced Gravity Oil Water Separator (EGOWS).

See **section 3.4** for more information.

The key design goals for new sites is to meet the discharge criteria of no visible oil during day-to-day operations and to contain the oil in the event of a major failure. This practicality corresponds to the following criteria:

- Suspended Solids: 50 mg/L
- Total Oil and Grease: 10 mg/L (based on Australian Water Quality guidelines and assumption that at this level no film is visible)
- pH: 6.5 - 8.5
- EGOWS capacity: Tank capacity = 110% of the volume of the largest transformer
- PPS capacity: Bund capacity = volume of the largest transformer plus 20mins fire fighting capacity (generally 5,000L)

Generally additional capacity will be provided with overflows to neighbouring bunds.

Oil can combine in a dissolved or emulsified form in water at rates up to 10 ppm as a result of travelling down a drain pipe. Emulsification increases with turbulence. Dissolved and emulsified oil cannot be separated by separation systems that rely solely on gravity for separation.

Operation of oil containment systems should be automatic and safe to operate and maintain.

The location and access to shut off valves and containment equipment is designed to ensure safety is not compromised in operation, particularly when operation may be necessary in low light conditions, in poor weather and during fire and spill incidents.

4.3.2 Existing sites

Ausgrid conducted a risk assessment study of 96 sub-transmission and zone substations sites in 2004 where oil containment facilities did not comply with current standards, to determine the likelihood of the failure of oil-filled equipment and the consequences of such a failure at each site, based on the volume of oil and its proximity to sensitive environmental areas.

Ausgrid plans to implement or remediate oil containment systems at each of the 96 sites assessed over a five year period. Oil containment enhancement work has already been completed at the majority of the 96 identified sites. There are 25 sites remaining which require work. These sites are separated into 2 groups;

- zone substations which currently have no oil separation will be fitted with Parallel Plate Separators and increased size bunds (PPS solution). 5 sites identified on the original list for the PPS solution were removed or placed on hold as the site has or will be retired.
- zone substations with existing discharge tanks will be fitted with flame traps, new gravel and increased size bunds. There are 27 sites remaining for this solution with work at some sites on hold as the site is due for retirement.

The total cost of installing PPS oil containment at sites with no oil containment over the five year period is $10.4M (2009-14 AER regulatory period).

The total cost of upgrading existing sites with flame traps, new gravel and increased bund size is $14.5M (2009-14 AER regulatory period). Some substation sites currently earmarked for this option may require the PPS system to be implemented instead, if the existing tank or its piping is found to be deteriorated or is damaged beyond economic repair.

A second stage of work has been approved to improve the oil containment across Ausgrid's sub-transmission substations. These works have been identified to address the risks associated with larger oil volumes, increased catchment areas, brick bunded and long underground pipe runs.

19 sites have been identified on this programme and the works include upgrades to; inadequate brick bunding, oil water separators and damaged pit and pipework at sub-transmission substations.

The total cost of the stage two works at the Sub-transmission substations is $10.8M and is expected to be completed by the end of 2015.

4.4 Maintenance and Monitoring of equipment

Ausgrid's transformer maintenance is undertaken in accordance with Ausgrid's *Network Technical Maintenance Plan for major substations*. This program involves planned 6 monthly checks for transformer gasket leaks, leaks around the drain cocks and checking oil levels on all gauges. Further checks are carried out at varying intervals and include thermal indicator checks, oil tests and corrosion checks. There are also ad hoc inspections and monthly security inspections at zone and STS substations that would identify oil leaks on other equipment.

All sub-transmission and zone substations transformers have a low oil alarm on equipment that is reported back to the system control centre. The System Control Centre is continuously manned. In the event of a major failure, the System Control Centre will be alerted immediately (either by electrical protection systems and/or oil monitoring systems).

Alarm systems incorporated into PPS oil water separators are specified for oil containment systems. The oil separator system shuts down in the event of a major oil incident and/or once the oil tank is full.

Ausgrid is further developing an oil leak database for use by transformer maintenance staff carrying out inspections. Leaks are prioritised based on a visual inspection. Repair of leaks may require the transformer to be off-line for a period while maintenance is carried out.

Occasionally, transformer leaks can be stopped by re-tightening the lid bolts to address gasket shrinkage. On other occasions the complete replacement of gaskets may be necessary. This work is based on a condition assessment and cost/benefit analysis. Costs for gasket replacement in sub-transmission and zone transformers are typically around $150,000 per transformer. Changing gaskets typically takes 10 working days, with the transformer out of service for this period.

4.5 Maintenance of oil containment systems

Maintenance of oil containment systems includes the inspection, cleaning and maintenance of transformer bunds, flame traps, pipes and oil containment tank, as applicable. The maintenance requirements for oil containment systems are outlined in the Network Standards *NS190 - Oil Containment Operational Requirements for Major Substations* and further detailed in the Network Technical Maintenance Plans *SU0115* and *SU0116* and instructions are.

Information such as type of oil containment systems and PCB concentration of oil from last testing are stored within Ausgrid's Integrated Asset Management System.

Ausgrid externally contract out the waste disposal requirements to appropriately trained and licensed waste contractors.

4.6 Sites to be decommissioned

Sites with no oil containment were identified in Ausgrid's oil containment programme which are either in the process of being decommissioned or programmed for replacement in the near future. These sites have been excluded from the upgrade programme as the works is likely to be commenced after the site has been decommissioned.

Each site will be assessed on an individual basis and where deemed necessary, interim controls will be implemented. These controls will be temporary in nature and may not meet the full requirements of Ausgrid's current Network Standards.

4.7 Noisy transformer replacement

Customer complaints regarding transformers are largely due to inappropriate developments and encroachments adjacent to Ausgrid zone substations. Nevertheless Ausgrid will aim to address noise complaints using reasonable and practicable methods as part of the Duty of Care Program. In limited cases this involves replacement of the transformer ahead of schedule where other factors such as condition would otherwise warrant the replacement.

The early replacement of these transformers has consequently reduced the occurrence and risk of leaks.

4.8 Spill Response, Training and Awareness

Spill kits are available at all major substations to attend to minor spills.

Emergency drainage plans are prepared for all STS and zone substations. The plans include details on oil containment such as onsite bunding, drainage flow paths, containment volumes and any emergency shut-off valves.

Ausgrid's environmental guideline *EG 100 Oil Handling and Spill Response* details response procedures to be followed in the event of an oil spill. The procedures cover the application of oil response kits, spill response trailers, oil tankers, reporting and product use. Transformer maintenance staff are trained in the application of these guidelines. Additionally, all large substations have emergency contact numbers which include an internal 24hr call-out number to phone in the event of an oil spill. Supporting this system is general environmental awareness training for all staff, Ausgrid's incident reporting and recording system and specialist Environmental Services group.

4.9 Environment Management System

Ausgrid is committed to conducting business without environmental harm, by protecting the environment and ensuring sustainable development.

Ausgrid has an overarching Environmental Management System Environmental Management System and includes environmental policies and a number of associated procedures. The Environmental Management System is certified to the Australian and International Standard AS/NZS ISO 14001:2004.

Ausgrid undertakes an annual environmental risk assessment to identify, evaluate for significance, monitor and communicate the environmental impacts, aspects and risks of our activities. This process also establishes and maintains environmental objectives and targets in line with continuous improvement.

Opportunities for improvements to the Environmental Management System will be programmed through the Environment Improvement Plan (EIP) which is reviewed annually via the environment risk assessment process. Ausgrid's Environmental Scorecard outlines key performance indicators for a financial year.

Ausgrid's Network Standards detail the construction, maintenance and monitoring requirements of equipment and containment systems.

Ausgrid's Environmental Guidelines detail response procedures to be followed in the event of an oil spill.

Regular review and updating of documentation is part of this strategy to ensure that Ausgrid's oil filled equipment management have the lowest practical risks.

5 Environmental Management Plan

Ausgrid is committed to minimising the environmental risk associated with oil filled equipment. As such Ausgrid has implemented a number of measures described in this plan which are aimed at effectively managing this environmental risk.

Key measures include:

- The use of risk assessments for managing and prioritising risks associated with oil filled equipment
- The use of EGOWS or PPS systems for all new sub-transmission and zone substations sites as a minimum standard
- A commitment to upgrade all zone substations sites with no oil containment to sites with PPS systems within 5 years at an estimated cost of $11M (2009-14 regulatory period)
- A commitment to upgrade all zone substations sites with inadequate bunds with flame traps, new gravel and increased bund size within 5 years at an estimated cost of $15M (2009-14 regulatory period)
- A commitment to upgrade all sub-transmission substations with inadequate brick bunding, oil water separators and damaged pit and pipework by the end of 2015 at an estimated cost of $11M
- The removal of all Scheduled PCBs from existing sub-transmission and zone substation transformers
- A commitment to phase out and manage all other PCBs on the network in accordance with Ausgrid's PCB licence
- Ongoing maintenance, monitoring of equipment and containment facilities
- Training and awareness in spill response and preparedness
- A commitment to adopt proven technologies that improve performance as soon as practicable
- A commitment to report against, review and update this plan on an annual basis.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **1. Major failure of sub-transmission and zone transformers**						
Reduce the likelihood of major failure.	No major failures.	**1.1** Transformer maintenance program.	**1.1.1** Maintenance is done according to Network Technical Maintenance Plan.	Network Operations	Ongoing	Ongoing
Aspect **2. Leaks in sub-transmission and zone transformers**						
Reduce the likelihood of oil leaks on the Environment.	Transformers adequately maintained, and leaks minimised	**2.1** Transformer maintenance program.	**2.1.1** Maintenance is done according to Network Technical Maintenance Plan.	Transmission Substation & Services	Ongoing	Ongoing
		2.2 Improve reporting methods.	**2.2.1** Development of a reporting procedure within SAP.	Maintenance & Replacement Planning, Environmental Services, Network Operations	Improved level of reporting for oil leaks within SAP.	Ongoing
		2.3 Transformer repair/refurbishment and replacement program.	**2.3.1** Major transformer leaks are considered in the transformer repair/refurbishment program.	Maintenance and Replacement Planning	Ongoing	Ongoing
Aspect **3. Containment in sub-transmission and zone substations**						
To reduce the risk to the environment given that oil is lost from a transformer tank (major failure).	Containment systems exist at all sub-transmission and zone substations effective at managing major oil loss	**3.1** Containment System Installation Program.	**3.1.1** Complete 26 sites with parallel plate separators systems by 2013/2014 in accordance with AG Duty of Care Plan April 2008.	Design & Engineering Services - Development Services , Projects – Civil Construction	Option D-5 Complete D-5 Construction Program in accordance with Duty of Care Plan April 2008.	No Action nominated.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
			3.1.2 Complete 54 site bund upgrades by 2013/2014 in accordance with AG Duty of Care Plan April 2008.	Design & Engineering Services - Development Services , Projects – Civil Construction	Option X construction at 13 sites subject to Safety Observer availability.	Complete Option X Construction Program in accordance with Duty of Care Plan April 2008. Subject to Safety Observer availability.
			3.1.3 Install EGOWS/PPS systems at all new Zone substations.	Network Operations	Ongoing	Ongoing
			3.1.4 Complete oil containment upgrades at 19 STS sites in accordance with Sub-Transmission Oil Discharge Compliance report.	Major Projects Network Development	Project funding approved and project development.	Project completion by end of 2015
		3.2 Update priority list of substations for oil containment.	**3.2.1** Review priority list on the risk assessment model.	Environmental Services	Update oil containment model with X and D-5 works.	Ongoing
		3.3 Investigate improvements to existing systems	**3.3.1** Develop strategy to address high priority issues associated STS sites.	Network Operations Projects – Civil Construction	Achieved	Achieved
			3.3.2 Develop strategy to address high priority issues at Zone sites.	Network Operations Projects – Civil Construction	Prepare project proposal to address high priority issues at Zone sites for AER regulatory submission.	Works in accordance with AER regulatory approval.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **4. Maintenance of sub-transmission and zone substation oil containment systems**						
Optimise the operation of existing oil containment systems.	Knowledge of containment system performance.	**4.1** Containment system inspection program.	**4.1.1**. Inspections on oil containment systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
		4.2 Maintaining oil containment systems	**4.2.2** Maintenance for parallel plate separator systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
			4.2.3 Maintenance for single stage, triple stage and EGOWS systems according to Network Technical Maintenance Plan.	Aqueous Waste Services Group	Ongoing	Ongoing
			4.2.4 Complete a review of Oil Containment maintenance activities.	Aqueous Waste Services Group, Environmental Services	Prepare updated procedure for the maintenance of oil containment systems.	No Action nominated.
		4.3 Develop trend analysis data from program of pumping oil from containment tanks.	**4.3.1** Data capture for trend analysis in SAP.	Aqueous Waste Services Group	Ongoing	Ongoing
		4.3 Develop trend analysis data from program of pumping oil from containment tanks.	**4.3.2** Prepare report on trend analysis on oil pumping/collection data from oil containment tanks.	Environmental Services	Preparation of report.	No Action nominated.

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
		4.4 Investigate improvements to existing containment systems	**4.4.1** Investigate and report on substations with unnecessary high stormwater inflows from yard drainage. Investigate the issues associated with GRC pits and other oil containment system components as required.	Design & Engineering Services - Development Services	Work in accordance with NIG12501 and finalise NIG12500.	Works in accordance with NIG12500 and NIG12501 for Oil Discharge Compliance at STS and Zone sites subject to Safety Observer availability.
Aspect **5. PCB in the Environment**						
Reduce the risk to the environment from PCBs	To manage oil with PCB in accordance with PCB Plan.	**5.1** Ausgrid's EMS410 PCB Management Strategy.	**5.1.1** Comply with PCB Chemical Control Order, Ausgrid's PCB license conditions & Ausgrid's PCB Management Strategy.	Network Operations	Ongoing	Ongoing
Aspect **6. Spill Response**						
Reduce the risk to the environment given a major failure of a transformer tank, leak and/or failure of the containment system.	All staff able to implement appropriate spill response procedures.	**6.1** Ausgrid's ET008 Oil Handling Training Program.	**6.1.1** All relevant work groups be trained in accordance with Ausgrid Environmental Training Program.	Network Operations Health Safety and Environment Environmental Services	Ongoing	Ongoing
		6.2 Emergency drainage plans for Zone and STS sites.	**6.2.1** Emergency drainage plans available and current at all Zone and STS sites.	Design & Engineering Services - Development Services	Ongoing	Ongoing

Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Target 2012-2013	Target Post 2013
Aspect **7. Distribution Substations**						
Reduce the risk to the environment given a major failure of a transformer tank or leak.	No material oil impact to the environment.	**7.1** Oil containment design advice for distribution substations prepared. Appropriate Network Standards upgraded as required.	**7.1.1** Investigate and report on risks posed by oil filled distribution equipment.	Environmental Services	Make recommendations based on preliminary investigations.	No action nominated.
		7.2 Oil containment provided in distribution substations.	**7.2.1** Distribution substation design meets oil containment requirements detailed in AS2067.	Design & Engineering Services - Development Services	Ongoing	Ongoing
Aspect **8. Benchmarking**						
To operate at industry best practice for the management of oil filled equipment.	To operate at or above industry best practice for the management of oil filled equipment.	**8.1** Benchmark oil containment requirements with other distribution utilities.	**8.1.1** Prepare benchmarking report to compare oil containment facilities across distribution utilities in NSW.	Design & Engineering Services - Development Services Environmental Services	Document strategies and performance by other agencies.	No action nominated.

6 References

- DECC Guideline - Bunding and spill management
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Volume1 (2000)
- AS 1940 The storage and handling of flammable and combustible liquids

Network Standards

- Ausgrid Network Management Plan
- Network Technical Maintenance Plan
- NS171 Firestopping in Substations
- NUS181 Approval of Materials and Equipment and Network Standard Variations
- NS186 Major Substations Civil Works Design Standard
- NS187 Passive Fire Mitigation Design of Substations
- NS189 Oil Containment for Major Substations
- NS190 Oil Containment Operational Requirements for Major Substations

Environmental Guidelines/Strategies

- EMS 410 PCB Management Strategy
- EG100 Oil Handling and Spill Response
- EG110 Transformer, Transformer Oil and Cable Oil Storage
- EG120 Waste Guidelines
- NUS174 Environmental Handbook
- ENVP01 Incident Response Procedure

Appendix A – Review of Oil Containment Systems/Separators

Appendix A - Review of Oil Containment Systems/Separators

1. Roofed Bunded Storage

Impervious roofed bunded storage areas designed to comply with AS1940 and DECC Bunding and Spill Management Guideline prevents discharge to the environment. Liquids collected in the sump or bund requires removal by liquid waste tanker to lawful disposal facilities.

Unfortunately, this option is not available in most cases as there are live electrical busbars and equipment located above ground. Nevertheless, the option is taken into account for all installations.

2. Open Bunded Storage

Where open bunded storage areas are used, rainwater captured in the bund must be managed to ensure the containment systems is not overtopped and oil is lost and to provide safe access to the contained area.

Ausgrid has assessed various oil water separators for their suitability.

One constraint on Ausgrid's choice of oil water separator is the large number of substations requiring oil containment.

The criteria used in assessing the available equipment are:

- Preference for a passive system - that is, one that does not require operator attention. This was to accommodate the large number of installations required by Ausgrid.
- A low maintenance system - systems that require manual pumping were regarded unfavourably.
- The ability of the system to meet the water quality objectives for visual amenity as defined by the Water Quality and River Flow Interim Environmental Objectives: Sydney Harbour and Parramatta River Catchment (October 1999) published by the DECC for NSW Government.
- The ability of the system to comply with other relevant guidelines and standards, including Australian Standards.
- Lowest life cycle cost of the requirement to install effective oil containment at over 200 substations precludes the use of overly expensive facilities.
- Size many substations are constrained by the land available for the construction of oil containment facilities, e.g. 20 metre long oil interception tanks. The head of water available also restricts the suitable construction area at many sites.

Various forms of water treatment systems for oil containment were reviewed are detailed below.

3. Gravity Separators

Gravity separators rely on the density differential between oil and water. Transformer oil has a relative density of 0.87 to 0.88, and rises to the surface under gravity in a suspension with water.

Single Stage Oil Water Separator and Triple Stage Oil Water Separator

These systems were historically installed into oil storage areas where roofing was not practical from access or because of electrical safety clearance and heat limitations. These systems were designed to meet the relevant standards at the time of installation

Water discharged through these systems relies on different density or specific gravity of oil water. Longer 'resident time'[3] (larger storage volumes improve the separation of the oil from the water.

Single stage separators (both circular and rectangular construction): During normal operation, oil and water discharge is not expected to achieve better than 100ppm. This is because a continuous

[3] *Resident time* is the theoretical time for a particle of water to travel through the separator. Calculate by dividing available storage (in L) by the design flow rate (in L/s).

flow system does not allow sufficient storage time to facilitate oil & water separation. As a result, during rainfall, the system allows unseparated oil to be discharged, potentially even in minor rainfall events.

Triple stage oil water separators have 3 chambers which ensures the flow path is not 'short circuited' hydraulically, but otherwise perform in the same manner. They may provide slightly longer travel paths and hence longer storage times. Discharge is not however expected to achieve results better than 100ppm.

Drainage from the bunds is directed to the oil water separator. Areas not required to be bunded should be drained directly to the stormwater system to ensure the separator is not hydraulically overloaded.

American Petroleum Institute Separator

The simplest oil water separation method is to detain the oily water in a low velocity (or zero velocity) environment for a sufficient time to allow the oil to float to the surface, and then to release the oil free water as underflow. The API Separator was designed to treat oily wastewaters from oil refineries. There is a marked difference in the application of API separators between refineries and substations. The API separator is designed to remove gross quantities of oil from refineries before further treatment of the water and re use of the oil.

Most oil water separators installed at Ausgrid substations are based upon the API separator design. Previous testing of an existing single stage separator installation at Kirrawee found that residence times (about 20 minutes) were too short to enable effective oil water separation. The oil water separator installed at Kirrawee conformed closely with guidelines for API separators.

Advantages

1. Low maintenance costs. Expected maintenance period would be every second year, to clean sludge from the bottom of the tank and remove oil from the top.

2. There are no mechanical moving parts such as pumps and actuator valves. Any such parts would require operation every two weeks to avoid seizing of the units.

Disadvantages

1. High capital costs, tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment (as required by Australian Standards). However, this criterion is applicable to all oil containment equipment. The geometry of the tank, and hence costs will be determined by the largest expected flow rate.

2. The effluent from an API separator is not expected to achieve better than 100ppm. This is above the EPA recommended guideline.

3. The effluent quality is expected to be worse if design flow rates are exceeded. Large surges in flow to an API separator can disrupt its performance, even if only for short periods of time (e.g. major stormwater runoff). To control separator inflow at a steady rate (at or below design inflow) is feasible, but requires containment or bypassing of the surplus water, at additional capital cost.

4. A risk of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the large inflow of oil.

Drainage Holding Sumps

These are simple storages for small volumes of oily water that permit batch treatment, or extended oil separation time. Drainage holding sumps can be used as collection and separation tanks that catch the wastewater and store it for a specified period. The system requires an automatic or manually activated pump system to operate as the tank approaches capacity. An automatic pump can reduce the flows expected in the tank and hence increase detention time in the tank. The system would also require an oil detection probe to trigger pump operation.

Advantages

1. Such a system would be capable of achieving the EPA recommended guideline of 10ppm by providing increased residence times.

Disadvantages

1. The intermittent nature of oily water inflow from substations complicates the installation of drainage holding sumps at Ausgrid. Ausgrid are cautious about using pumps as part of their wastewater treatment system, as reliability can be reduced and maintenance requirements could be high.

2. Prolonged fire as there is no drainage of the fuel source.

4. Oil Coalescers

Oil Coalescers provide a shorter path for oil droplets to travel before they reach an oily surface on or with which they can coalesce.

Parallel Plate (Coalescing Plate) Oil Water Separator

This system is installed where roofing is not practical because of access restrictions for loading or because of electrical safety clearance and heat limitations. Water is discharged through oil water separators containing a coalescing plate. The coalescing plate system requires less site area than EGOWS systems.

Aboveground separators rely on pumps and float controls to maintain storage areas in a dry condition.

Areas not required to be bunded should be drained directly to the stormwater system to ensure the bunds do not overflow and the oil water separator is not hydraulically overloaded.

Plate separators systems: Plate separators are capable of providing discharge rates of 10 ppm for oils and greases. This oil containment system relies on containing oil within the bund during a major failure.

Because the discharge from separators drains to stormwater, separators must be selected to ensure water quality discharge is achieved, oil is contained and the system shuts down in the event of a major oil spill, with appropriate alarms installed so that bunded storage can be maintained before oil discharges to the environment. Parallel plate separators designed to discharge water to sewer are not typically suitable for this application.

These devices generally consist of a series of parallel, corrugated plates placed in line with the oily water flow through a chamber. The plates are frequently angled up and may be semi folded. They rely also on the tendency of oil droplets to rise in water but have the advantage that the oil droplets need only rise (at most) a height equal to the distance between the plates. Thereafter, the oil progresses upwards along the surface of the plate and finally as an accumulation of small drops. The accumulation of small drops leaves the plate as one larger drop and rises to the surface.

Advantages

1. The advantage of oil coalescers is that they are generally more compact than the API type separators. Parallel plate coalescers however, have greater maintenance requirements.

2. Manufacturers report that Parallel plate coalescers are capable of achieving 10 ppm effluent oil content. For large flow rates, this substantially increases the size of the coalescing plate pack. In the absence of data on inflow oil globule size distribution, supplier claims for less than 10 mg/L oil in separator effluent cannot be tested.

Disadvantages

1. Plate coalesers are designed to separate oil droplets larger than 60 microns. If above design oily water flows are experienced, oil can be re entrained by turbulent flow in the narrow channels between the plates. The cross flow design is intended to minimise this problem.

2. High maintenance costs, the plate pack must be cleaned frequently. Maintenance would require emptying of the tank and disposal of oil by an approved method.

3. The plate packs are generally made from polyurethane. In the event of a major failure, hot oil (160° Celsius) could melt and destroy the plate packs.

4. High capital costs, the tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment. However, this criterion is applicable to all oil containment equipment.

5. There is a possibility of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the oil.

Flow Restriction/Impact Coalescers

These include fibre mats, filters, and membranes, through which the oily water flows. The oil droplets are forced to impact on oily surfaces and other droplets, and coalesce with them. A head loss is incurred, which requires a pumping system and operator attention.

Filter systems can remove oil droplets down to 5 microns, but can easily be blocked by solids in the oily water.

5. Centrifugal Separators

Centrifugal separators (vortex or cyclone type) increase the 'gravity' forces, and can separate oil from water provided enough head is available. However, centrifugal separators cannot be regarded as passive systems. These separators are used mainly in offshore situations, e.g. ships, oil production platforms, and have high energy and maintenance requirements.

6. Proprietary Stormwater Drainage Systems E.G. Humeceptor (Stormceptor)

This is a low energy devices are designed to remove oil and settleable sediment from stormwater flows by principles similar to the API separator. Humeceptors are circular in plan and have a baffle system to help direct flow. The Humeceptor is divided into two sections, the treatment chamber and the bypass chamber. The treatment chamber is a circular chamber designed to separate oil and sediment at the design flow rate. The flow is directed into the chamber by an inlet pipe that is laid horizontally and is directed around the circumference of the chamber. The direction of the inlet pipe is critical in preventing short circuiting and turbulence in the system.

Advantages

1. The treatment system will be bypassed when flow rates are in excess of the design flow rate, thus eliminating resuspension of oil and sediment in the treatment chamber.

2. Provides quick drainage for oil.

Disadvantages

1. The Humeceptor is designed to treat non point source pollution from urban runoff. The design of the system is based on the assumption that the contaminants are contained in the first flush of rainfall. This assumption has not been proven true for applications such as Ausgrid's.

2. At flows greater than the design flow, the stormwater bypasses the treatment chamber and is directed over the inlet weir. Large flows move directly through the Humeceptor system without any treatment.

3. The largest of the Humeceptor tanks is only capable of containing 4290 litres of oil. This is well below the average volume of oil in Ausgrid transformers. This treatment unit would need to be used in conjunction with a cut off valve at the bunded area, or an additional tank capable of containing the total volume of oil in the largest transformer.

7. Flotation Separators

These apply pressure to the oily water using dissolved air or other gases. On release of the pressure, small bubbles are formed that attach to oil droplets and increase their buoyancy, taking them to the surface with increased velocity. This is called Dissolved Air Flotation (DAF) and is widely used in the separation of particulate solids from liquids. Dissolved Air Flotation is widely used for sludge treatment in Wastewater Treatment Plants. In an alternative concept, Induced Air Flotation, air is drawn into the oily water stream as fine bubbles.

These flotation methods can remove 5-micron oil droplets from suspension and are used mainly for secondary water treatment. Their operation requires pressurised conditions, and operator attention.

8. EGOWS Separator Design

Ausgrid in conjunction with the University of New South Wales has developed a world leading and innovative oil/sediment/water separation system patented in Australia, New Zealand, USA and Europe, known as the Enhanced Gravity Oil Water Separator (EGOWS). The design achieves lower oil levels in effluent than do the API Separator (API) and Parallel Plate Separators (PPS). This is because the API and PPS operate with a full vessel of water and thus short-circuiting of inlet oily water to the outlet cannot be completely prevented.

The review of available equipment highlighted two important parameters for effective oil water separation:

Residence Time - increased residence times allows for time for smaller oil droplets (which rise with lower velocities) to rise to the surface; and

Quiescent Conditions - a low (or zero) velocity environment, free from turbulence is ideal. High velocities and turbulence are not conducive to the separation of oil from water.

The EGOWS Oil Water Separator was designed to provide increased residence times within the tank. Increased residence times allows for more effective gravity separation of oil from water. The design takes advantage of the need for the separator to contain the oil spilled in the event of major failure of the largest transformer on site. The EGOWS separator design provides a potential oil storage volume and does not always operate full of water, unlike traditional gravity separators. The design thereby provides storage capacity for at least the `first flush' of oily water influent, and in most cases the total runoff from a site during a rainfall event.

The design is based on the API separator, and includes an automatic siphon that releases water from the otherwise standard separator and so creates a potential storage for a specified volume of oil water mixture.

The volume within the tank operating range is progressively filled with the oil water mixture from successive rainfall events or from a major oil spillage. Until this volume is accumulated, oil droplets can rise through and separate from the water over a much longer period than the residence time available in the standard through-flow separator. The main chamber is quiescent with virtually zero turbulence except during inflow periods and at the end of each cycle when the siphon is operating (which will induce negligible turbulence).

EGOWS tanks are a non continuous flow system and hence the degree of separation is much greater, generally achieving less than 10 ppm for oils and greases. A residence time of 3 days (on average) is achieved which is sufficient to attain these low levels of oil in the discharge. In major storm events, continuous flow will occur in the tank. This is considered statistically acceptable as for the majority of the time as the tank is not under continuous flow.

Operating Principle of the EGOWS Separator

Stage I: Tank Empty - After installation, the empty tank will be filled with clean water above the skimmer level. At this time, the tank is ready for operation.

Stage 2: Inflow and Separation - An initial storm event leads to an inflow of oil-water mixture. During this inflow period, oil water separation also occurs. No outflow occurs in this period, as the water level is below the siphon crest level.

Stage 3: Separation - During this time between storm events, no outflow occurs. Successive storm events add to the oil water content of the tank. Oil water separation occurs throughout this period.

Numerical modelling (based on real rainfall data) for 1996 shows that stage 3 separation can last for up to 8 weeks.

Stage 4: Inflow/Separation and Outflow - During the priming storm event, the tank fills up to (and over) the Siphon Crest Level. At this stage, the siphon will prime, and discharge oil free effluent. Clean water flows under the skimmer wall and is drawn by the siphon from between the skimmer wall and the end weir. The siphon empties the tank over 9 hours.

Stage 5: Tank empty - The tank is emptied by the siphon down to the siphon break level, and is ready for the next storm.

It is necessary to periodically remove oil from the surface of the tank. Allowing oil to accumulate to excessive levels in the tank will impede the effective operation of the tank. Manholes at the top of the tank provide access to the tank, allowing oil to be skimmed from the surface of the tank during maintenance.

Advantages

1. Because it holds the oily water in quiescent conditions for days, even weeks, before discharge, the EGOWS concept is capable of achieving the EPA recommended guideline level effluent specification of 10 ppm oil and grease.

2. The EGOWS separator is designed to gradually fill following successive storm events. The API separator (API) and the Parallel Plate Separator (PPS) operate with a vessel full of water. Short circuiting of oily water inflow to the outlet occurs in through flow separators, even at inflows below design.

3. In flow surges, as in a rainfall runoff event, both the API and EGOWS Separator are designed to fill under conditions of low turbulence (except adjacent to the inlet baffle), and with extended residence times.

4. If the inflow from a rainfall runoff event exceeds that required to prime the siphon, the separator water level will rise a further 70mm (750 L or 1.7 mm of rain) before water flows over the end weir. In this case, the EGOWS separator will be effectively operating as an API separator. Numerical modelling (based on real rainfall data) for 1996 shows that the end weir only operated on 2 occasions in 1996. Providing a higher end weir would prevent this from occurring, and ensure that the siphon is the only means of discharge from the tank.

5. The EGOWS separator is a flow retarding structure that prevents the rainfall runoff peak from overloading downstream drainage systems. Separators operating full of water pass on the peak flow almost immediately. The principle of holding back peak flows is economically attractive, and is increasingly employed in urban stormwater drainage systems.

Disadvantages

1. High capital costs, tank must be capable of containing 110% of the volume of oil in the largest capacity oil filled equipment. However, this criterion is applicable to all oil containment equipment.

2. Risk of oil escaping following a major failure. Containment of major failure relies on the displacement of the existing water in the tank by the oil. Given ideal conditions, a large volume of oil will displace the water in the interception tank, thereby preventing the loss of oil from the site. However, in reality, the development of flow surges and short-circuiting in the tank could lead to the escape of oil under the skimmer wall. This might occur if a very large volume of oil were spilt, e.g. a spill volume comparable to the capacity of the interception tank. This is a concern that is common to all oil interception tanks.

Appendix B – Major Transformer Failure Information

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Transformer failures can be divided into two categories:

- Failure of the core and coils, or other components within the main tank of the transformer; and
- Failure of ancillary components (e.g. tap changers, bushings, cable boxes, link boxes etc).

1. Failures within the Transformer Tank.

Failures of the core and coils may result from poor design or manufacturing defects. Other defects may also occur in the transformer due to gradual deterioration over time. Oil samples are taken from transformers regularly, and assessment of transformers' condition is in part based upon analysis of these results.

Most failures within the main tank do not result in a fire as the fault is normally under the oil volume within the transformer tank. However, if the forces arising from the failure results in the transformer tank splitting, the combustible gases generated by the fault can mix with oxygen, and a major fire, fuelled by the volume of transformer oil, may result.

In situations where the operation of the transformer is critical, any unit that has reached the theoretical end of life, or that has other faults that cannot be economically repaired, should be replaced. However, it is Ausgrid's general policy to run transformers to end of life (supported by a suitable 'spares' pool).

2. Degradation of Paper Insulation

In older transformers, failures often result because the mechanical strength of the paper insulation due to aging is inadequate, and is unable to withstand the mechanical forces experienced within the transformer during through fault conditions. (i.e. a fault external to the transformer, that results in an increased current through the transformer).

The theoretical "End of Life" of a transformer, is usually defined as the point when the Degree of Polymerisation (DP) of the insulating paper falls below 200. At this point, it is unlikely that the transformer will survive a through fault. However, if the transformer is not subjected to any major through fault, it may continue to operate satisfactorily for many years.

Furans are a by-product of the degradation of the paper insulation within the transformer. Measurement of the furans in an oil sample gives an indication of the condition of the paper. Based on furan measurements some transformers on our system are probably at or near the theoretical end of life.

When the insulation in a transformer has degraded, it cannot be repaired or replaced. Replacement of the transformer windings is the only practicable solution to this problem. This is rarely economical for an old transformer.

3. Arcing, Overheating & Partial Discharges

Other faults within the transformer will generate gases that dissolve in the oil. Dissolved Gas Analysis (DGA) gives an indication of faults within a transformer. Some transformers on our system have DGA results indicating arcing, excess heating, or partial discharges within the main tank.

Faults within the transformer detected by Dissolved Gas Analysis, can occasionally be repaired on site, but often involve moving the transformer to a workshop for detanking and dismantling. This is rarely economical since there is no guarantee that the problem will be found and corrected.

4. Oil with Low Electric Strength

A transformer will only operate correctly if the insulating oil has adequate electrical insulating properties. Operation of the transformer cannot be guaranteed if the electric strength of the insulating oil falls below minimum standards. Electric Strength of Oil can be easily measured, and based on these measurements, some transformers on our system have oil with low electric strength.

The electric strength of the oil can easily be corrected by processing the oil through an oil treatment plant, to remove contaminants, particles and the excess moisture. However, most of the moisture within the transformer is contained within the insulating paper. Drying the oil removes only a very small amount of moisture from the transformer (approx 1%). When the dry oil is pumped back into the wet transformer, moisture is transferred from the paper to the oil, and within a short period (say 2 – 4 weeks) the oil will again be wet and the electric strength low. Hence repeated drying processes are required.

Drying the oil can be done either 'on-line' or 'off-line'. Ausgrid typically utilises 'on-line' methods as this has been shown more effective and lower cost.

5. Failure of Ancillary Components

Recent experiences within Ausgrid, as well as results of CIGRE surveys, indicates that most transformer problems result from failure of ancillary components.

Many of these failures involve the On Load Tap Changer, which is the only component of the transformer that involves moving parts. Failure of a tap changer often also results in a failure of the transformer windings, resulting in the transformer requiring major repair work or scrapping.

Other ancillary components include bushings, cable boxes, and link boxes. Recent incidents include:

- A shunt reactor at Mason Park was destroyed by a fire resulting from a bushing failure (circa 1995).
- The fire at Chatswood Zone in 1999 is believed to have resulted from a failure of the cable box.
- The fire at Paddington Zone in 2000 is believed to have resulted from a problem with the transformer's link box.

6. Tap Changers

Tap Changers are regularly maintained. Reliability Centred Maintenance studies have recently been carried out on the most common tap changers on the system to determine the most appropriate maintenance and maintenance intervals for these units. The outcome of this process is included in the Network Technical Maintenance Plan.

7. Bushings

High voltage condenser type bushings, with a testing tap (i.e. all 132 kV bushings and some 66 kV bushings) are tested during routine testing of transformers. Ausgrid has a bushing replacement program where defective bushings are identified and serviced. The replacement of oil impregnated bushing with resign impregnated bushings is being initiated to reduce risk.

Other bushings are not easily tested, and there is currently no test regime in place for these bushings. This is of particular concern for condenser bushings without a test tap. These are given a higher priority in the bushings replacement program.

8. Cable Boxes

Most cable boxes are oil or gel insulated. Historically most failures of the cable boxes were due to the ingress of moisture into the insulating oil/gel, or leakage of the oil or gel from the box, resulting in arcing and flashover from the bushings within the cable box. In addition, some oil insulated cable boxes are fitted with condenser type bushings. These cable boxes are at a greater risk of failure due to possible ingress of moisture into the condenser layers of the bushings.

Testing of the bushings within a cable box would be extremely difficult, and would best be suited to a workshop environment. Replacement of these bushings would also be difficult, but possible, if identical bushings were manufactured. Replacement or repair of the equipment is determined based on condition based assessment and cost/benefit analysis.

9. Link Boxes

Link box failures generally result from the ingress of moisture into the box. Link boxes may be frequently opened to allow testing of the transformer and associated cables. This leads to increased likelihood of contamination and moisture ingress.

Some link boxes contain barrier boards, which may absorb moisture, and lead to a major failure. Based on information available, all transformers with barrier boards used in their link boxes have been identified, the boards tested, and defective boards replaced where necessary. Ensuring that the transformer and link box oil is kept dry should reduce risk of failure of barrier boards.

Appendix C – Transformer Types, Sizes and Typical Quantities of Oil

Appendix C - Transformer Types, Sizes and Typical Quantities of Oil

Transformer type	Rating	Number of transformers	Typical quantity of oil / unit (L)	Estimated quantity of oil (kL)
Sub-transmission	19 MVA	3	15000	45
Sub-transmission	20 MVA	4	15000	60
Sub-transmission	30 MVA	6	15000	90
Sub-transmission	60 MVA	33	20000	660
Sub-transmission	80 MVA	1	30000	30
Sub-transmission	120 MVA	44	50000	2200
Zone 132/11kV	36 MVA	13	15000	195
Zone 132/11kV	38 MVA	33	15000	495
Zone 132/11kV	45 MVA	11	20000	220
Zone 132/11kV	48 MVA	16	20000	320
Zone 132/11kV	50 MVA	69	20000	1380
Zone 66/11kV	< 10 MVA	3	5000	15
Zone 66/11kV	13 MVA	2	10000	20
Zone 66/11kV	14 MVA	4	10000	40
Zone 66/11kV	15 MVA	3	1000	3
Zone 66/11kV	19 MVA	5	15000	75
Zone 66/11kV	20 MVA	1	15000	15
Zone 66/11kV	25 MVA	10	15000	150
Zone 66/11kV	33 MVA	19	15000	285
Zone 33/11kV	1 to 5 MVA	12	5000	60
Zone 33/11kV	6 to 10 MVA	9	5000	45
Zone 33/11kV	11 to 15 MVA	68	15000	1020
Zone 33/11kV	16 to 20 MVA	114	15000	1710
Zone 33/11kV	21 to 25 MVA	34	15000	510
Zone 33/11kV	26 to 30 MVA	11	15000	165
Zone 33/11kV	33 MVA	66	15000	990
Total		**594**		**10798**
Note: current June 2012, refer to SAP for current equipment quantities				

Transformer type	Rating	Number of transformers	Typical quantity of oil / unit (L)	Estimated quantity of oil (kL)
Distribution 12.7 kV pole	5 to 50 kVA	58	50	2.9
Distribution 11 kV 1 phase pole	1 to 65 kVA	1306	50	65.3
Distribution 11 kV 3 phase pole	1 to 75 kVA	6814	50	340.7
Distribution 11 kV 3 phase pole	100 to 160 kVA	1283	100	128.3
Distribution 11 kV 3 phase pole	200 to 250 kVA	2514	200	502.8
Distribution 11 kV 3 phase pole	300 to 375 kVA	1424	300	427.2
Distribution 11 kV 3 phase pole	400 kVA	2100	400	840
Distribution 11 kV 3 phase pole	500 kVA	17	500	8.5
Distribution 11 kV 3 phase pole	>500 kVA	1	500	0.5
Distribution 11 kV - Kiosk	15 to 160 kVA	225	100	22.5
Distribution 11 kV - Kiosk	200 to 250 kVA	72	200	14.4
Distribution 11 kV - Kiosk	300 to 380 kVA	711	300	213.3
Distribution 11 kV - Kiosk	400 kVA	3461	400	1384.4
Distribution 11 kV - Kiosk	500 to 550 kVA	835	500	417.5
Distribution 11 kV - Kiosk	600 kVA	2389	600	1433.4
Distribution 11 kV - Kiosk	750 kVA	1367	700	956.9
Distribution 11 kV - Kiosk	800 to 820 kVA	1222	800	977.6
Distribution 11 kV - Kiosk	1000 kVA	1129	1000	1129
Distribution 11 kV - Kiosk	1500 kVA	152	1500	228
Distribution - other enclosures	50 to 150 kVA	23	100	2.3
Distribution - other enclosures	200 to 250 kVA	253	200	50.6
Distribution - other enclosures	300 to 350 kVA	207	300	62.1
Distribution - other enclosures	400 to 475 kVA	291	400	116.4
Distribution - other enclosures	500 kVA	797	500	398.5
Distribution - other enclosures	600 kVA	12	600	7.2
Distribution - other enclosures	700 to 750 kVA	1109	700	776.3
Distribution - other enclosures	800 kVA	10	800	8
Distribution - other enclosures	950 kVA	3	900	2.7
Distribution - other enclosures	1000 kVA	1463	1000	1463
Distribution - other enclosures	1500 kVA	1313	1500	1969.5
Total		**32561**		**13949.8**
Note: current June 2012, refer to SAP for current equipment quantities				

Total Volume of Oil = 10,798 + 13,949.8 = 24,747.8 kL

Ausgrid

Environmental Management Strategy – Polychlorinated Biphenyls

EMS 410

Version 7.0

28 Sep 2012

Document control

Document status	Final
Document type	Management system policy
Document suite	Environment
Release Authority	James Hart
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Functional application	Document the management strategy for polychlorinated biphenyl's
Organisational application	Reference to Ausgrid's management strategy for polychlorinated biphenyl's

Document history

Version	Summary of changes	Author
7.0	New template, updated management plan actions	Environmental Services

Contents

Executive summary

[Replace this section with a summary of the management strategy.]

Glossary

Term	Meaning
ADG	Australian Dangerous Goods Code
ANZECC	Australian and New Zealand Environment and Conservation Council
Bund	An impervious barrier to retain liquid.
CB	circuit breaker
CCO	Chemical Control Order
DECCW	Former Department of Environment, Climate Change and Water (now OEH)
EPA	Environment Protection Authority (part of OEH)
kg	kilogram
L	litre
MSDS	material safety data sheet
NATA	National Association of Testing Authorities
OCP	organochlorine pesticides
OEH	Office of Environment and Heritage
PCB	polychlorinated biphenyls
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PPE	personal protective equipment
ppm	parts per million. For the purposes of this document, ppm can be considered the same as milligrams per kilogram (mg/kg).
STS	subtransmission substation
WHS Act	Work Health and Safety Act
ZS	zone substation

1 About this document

This document provides guidance to assist staff in handling, storing, transporting and disposing of Polychlorinated biphenyl's in accordance with legislative requirements.

This document also outlines Ausgrid's PCB Management Strategy.

If further information is required contact the **Environmental Services** on **9394 6659**.

If PCB testing is required contact **Network Test – Insulation Assessment Laboratory**, on **9410 5119**.

NOTE: This management plan is for use by Ausgrid staff only.

2 Background

2.1 Polychlorinated biphenyl's

Polychlorinated biphenyl's (PCBs) are a group of related thermally and chemically stable chemicals known by the generic name 'Askarel'. Common trade names are 'Aroclor', 'Pyroclor' and 'Pyralene'. They have been in use for over 40 years and are particularly suitable as the dielectric in HV capacitors because of their chemical stability, low flammability and high dielectric constant. They have also been widely used in power transformers, which are installed in fire sensitive locations, particularly in the United States. In Australia PCBs have generally been used in instrument transformers or as an additive to insulating oil.

Unfortunately, PCBs are so stable that they are difficult to dispose of once they are no longer required. PCB residues can accumulate in living tissue in fish, birds, animals and humans through the food chain. Substitute liquids have therefore been developed to replace PCBs. Generally, their electrical properties and fire resistance are inferior to PCBs but, like normal transformer oils, they are biodegradable.

The effects of PCBs on humans depend on the form of contact and the dosage received.

Ausgrid no longer purchases equipment containing PCBs or new supplies of PCB for existing equipment. The procedures detailed in this plan are designed to ensure that PCBs in existing equipment do not enter the environment, are not ingested or absorbed by humans, and are treated in accordance with the National PCB Management Plan, April 2003.

2.2 History of PCB Management with Ausgrid

Ausgrid like other members of the Electricity Supply Industry, have used polychlorinated biphenyl's (PCBs) in a concentrated form as a dielectric in HV electrical equipment since the 1920s. The practices at the time, combined with the belief the PCBs were not harmful, lead to cross contamination, resulting in large amounts of mineral insulating oil becoming contaminated.

In the late 1970's, the purchase of equipment containing PCBs was ceased.

In 1989 Sydney Electricity commenced a replacement program for equipment containing pure PCBs[1]. This program was temporarily suspended due to the commonwealth government banning the export of hazardous wastes. The program was re-commenced in 1995 with the availability of a licensed facility within Australia. In 1997 Ausgrid commenced a replacement program for all other equipment containing Scheduled PCBs in line with the PCB Management Plan.

3 Legal requirements

The use, removal and disposal of PCB material and PCB wastes in Australia are covered by the following legislation and agreements:

3.1 Basel Agreement

The Basel Agreement is an international agreement that restricts the international trade in hazardous wastes. This agreement prevents Australia exporting its PCB wastes overseas for treatment.

3.2 Polychlorinated Biphenyls Management Plan, April 2003

The Australian and New Zealand Environment and Conservation Council (ANZECC) developed a national approach and management plan for PCB's.

The document is of a non-statutory nature and has the endorsement of ANZECC. Implementation of this plan is the responsibility of individual state or territory governments using whatever means apply in their respective jurisdictions.

3.3 Environmentally Hazardous Chemicals Act, 1985

This is a NSW state legislation, which controls the generation, storage, transport and disposal of hazardous chemical wastes in the state of New South Wales. Under this legislation the EPA issues individual Chemical Control Orders (CCOs) to control chemical wastes. It is by this mechanism that the NSW government implements the National Management Plan for PCB Wastes.

The Polychlorinated Biphenyl Wastes (PCB) Chemical Control Order 1997 controls the management of equipment and waste oils containing PCB. This CCO generally stipulates that the generation, storage, transport and disposal of PCB wastes in NSW can only be carried out in accordance with a licence issued by the EPA. The CCO also outlines levels of PCB for determining what is PCB waste and requirements for the generation and storage of small amounts of PCB wastes provided specified limits are not exceeded.

3.4 Protection of the Environment Operations Act, 1997

The Protection of the Environment Operations Act 1997 sets the obligations relating to water and air pollution, PCB waste generation, storage, transport and disposal.

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[1] Pure PCBs are defined as liquid dielectrics, which typically contain a mixture of 70% PCB and 30% thinner, i.e. 700,000mg/kg of PCB.

3.5 Protection of the Environment Operations Amendment Act, 2005

The Protection of the Environment Operations Amendment Act 2005 extends to proceedings in connection with the Environmentally Hazardous Chemicals Act and regulations under that act.

3.6 Protection of the Environment Operations (Waste) Regulation 2005

The Protection of the Environment Operations (Waste) Regulation 2005 specifies waste tracking requirements associated with the transportation of PCB wastes.

3.7 Dangerous Goods (Road & Rail Transport) Act, 2008

The legislation requires that nominated goods shall be transported in accordance with the current edition of the Australian Code for the Transport of Dangerous Goods by Road and Rail (the ADG Code). Scheduled PCBs are goods covered by the ADG Code and the Code is nominated by the 1997 PCB CCO as the relevant publication for governing the transport of PCBs.

The basic intent of all of this legislation is to limit the amount of PCBs in the environment and to ensure that dangerous conditions are not created during PCB removal, waste handling, transporting and disposal activities.

The direction given by this document in any area complies with the requirements of the above legislation. Failure to comply with the directions detailed in this document may give rise to unlawful actions and subsequent prosecution as well as causing harm to the environment.

3.8 Work Health and Safety Act, 2011

The objectives of the Work Health and Safety (WHS) Act, 2011 are to secure and promote the Health, Safety and Welfare of people at work. The WHS Act applies to all hazardous substances, PCBs included.

4 PCB definitions

Table 1 PCB definitions

PCB Concentration	Definition
Concentrated PCB Material	Material that contains PCBs at or greater than 100,000mg/kg.

PCB Concentration	Definition
Scheduled PCB Material	Materials that contain PCBs at concentrations equal to or greater than 50mg/kg **and** that contain more than 50g of PCBs. *Example:* *A transformer contains 1800kg of oil, which in turn contains 52mg/kg of PCBs. The transformer is in storage pending recommissioning.* *Because the transformer has a further use, it is considered a material rather than a waste. Because there are more than 50g of PCBs (the oil contains (1800x52)/1000 = 93.6g of PCBs), the material is a Scheduled PCB Material.* **Note:** If the transformer did not have a further use, then it would be considered a Scheduled PCB Waste.
Non-scheduled PCB Material	Materials that contain PCBs at levels equal to or greater than 2mg/kg and less then 50mg/kg.
PCB material	Materials that contain PCBs at levels equal to or greater than 2mg/kg.
PCB free material	Materials that contain PCBs at levels less than 2mg/kg.
Concentrated PCB Waste	Waste that contains PCBs at or greater than 100,000mg/kg.
Scheduled PCB Waste	Wastes (greater than 50g) that contain PCBs at concentrations equal to or greater than 50mg/kg. *Example: A current transformer contains 80kg of oil, which in turn contains 156mg/kg of PCBs. The current transformer has no further use.* *Because the current transformer has no further use, it is considered a waste rather than a material. Because there are more than 50g of waste (80kg), the waste is a Scheduled PCB Waste.* **Note:** If the CT had a further use, then it would be managed as a Non Scheduled PCB Material (less than 50g of PCBs) **Note:** It is possible for Non Scheduled Material to become Scheduled Waste.
Non-scheduled PCB Waste	Wastes that contain PCBs at levels equal to or greater than 2mg/kg and less then 50mg/kg.
PCB waste	Wastes that contain PCBs at levels equal to or greater than 2mg/kg.
PCB free waste	Wastes that contain PCBs at levels less than 2mg/kg.

NOTE: Out of service PCB contaminated equipment should NOT be kept in storage with the intent of preventing the equipment becoming a Scheduled PCB Waste.

5 Environmental management plan

The timetable for the removal of Scheduled PCBs from Ausgrid is in line with the *Chemical Control Order in Relation to Materials and Wastes Containing Polychlorinated Biphenyl (PCB) 1997*. A flow diagram detailing the process for PCB classification and management is shown in **Figure 1**.

An initial survey of equipment was completed by 1 January 1999. The survey identified probable locations and probable quantities of scheduled PCB material and scheduled PCB waste. Testing requirements are outlined in the PCB Chemical Control Order and **Appendix A** & **B**.

5.1 Survey of Equipment

The purpose of the survey was to identify all concentrated PCBs in priority areas, all other concentrated PCBs, all equipment that has a probability of 1% or greater of containing Scheduled PCB material and all other equipment except small equipment which is likely to contain PCBs. The survey process is simplified in **Figure 1**.

The following results have been derived from in excess of 10,000 PCB samples and corresponding analysis

5.1.1 Priority Areas

Priority areas are defined as areas which require a particularly high level of protection. Such areas include, but are not restricted to, proclaimed potable surface and underground water catchment areas, food processing facilities, animal feed lots, schools and hospitals. They also include areas of the environment which fish and other aquatic vertebrate species use for spawning purposes and areas of the environment which provide a habitat for a species that is likely to become extinct unless action is taken to remove the factors which threaten its survival.

All concentrated PCBs will be removed on the assumption that they are located in priority areas, this ensures a conservative approach.

5.1.2 Equipment not likely to contain PCBs

All equipment purchased after 1980 which has NOT had its oil changed prior to 1997, is considered to be PCB free.

5.1.3 Equipment with known concentrations of PCBs

A register of all tested equipment with known PCB concentration levels (except concentrated PCBs) can be found in U:\PCBs\

5.1.4 Equipment containing Concentrated PCBs

The 1999 survey identified a number of substations containing equipment identified as containing pure PCBs. This equipment is mainly Voltage Transformers, CLC capacitors and Ripple Filters

Ausgrid has removed all known concentrated PCBs from the Network.

5.1.5 Equipment classified according to the 1% criteria

Where equipment does not contain concentrated PCBs and is not likely to be PCB free, it can be classified according to a 1% criteria. Equipment classified this way which has a probability of 1% or greater of being scheduled PCB material or scheduled PCB waste shall be managed as such unless analyses are undertaken which indicate otherwise.

Three possibilities for equipment grouped according to the 1% criteria are:

- **Type 1 – Equipment**. The material is treated as scheduled PCB material (unless tested otherwise) until it needs to be scrapped. Once scrapped, the material is treated as scheduled PCB waste unless tested otherwise. All equipment is to be tested.

- Existing type 1 equipment includes zone VTs (Ducon and Endurance), zone regulators and TCATs

- **Type 2 – Equipment**. The material is treated as non-scheduled PCB material (unless tested otherwise) until it needs to be scrapped. Once scrapped the material is treated as scheduled PCB waste unless tested otherwise. Testing is to be carried out at the time of maintenance, repair or disposal.

  - Existing type 2 equipment includes distribution Txs, zone aux Txs, zone VTs (other than type 1 VTs), zone TX selectors and zone Tx diverter.

- **Type 3 – Equipment**. The material is treated as non scheduled PCB material (unless tested otherwise) until it needs to be scrapped. Once scrapped the material is treated as Non Scheduled PCB Waste unless tested otherwise. Testing is to be carried out at the time of maintenance, repair or disposal.

  - Existing type 3 equipment includes distribution LV and HV PCBs (including RMIs, reclosers and fuse switches), zone tx main tanks, zone tx tap changers, zone reactors, zone auxiliary tx.

Up-to-date detail of Ausgrid's ongoing PCB test results and register is available on U:\PCBs\. Some of the equipment types have been reclassified as a result of the Scheduled PCB Removal Program.

5.2 Risk Management Plan

The following forms the basis of Ausgrids Management Plan for PCBs. The plan will be constantly updated:

5.2.1 PCB Removal

1. Remove all concentrated PCBs in priority areas from service by January 2001.
   No priority areas have been identified. No removal works required.
2. Remove all other concentrated PCBs not in priority areas from service or else carry out in situ treatment to less than 50mg/kg by 1 January 2004.
   All known concentrated PCBs have been removed
3. Remove all identified Scheduled PCB material from service or else carry out in situ treatment of identified Scheduled waste to less than 50mg/kg within 5 years of identification.
   This includes all type 1 equipment (until tested) and all identified Scheduled PCB material (except concentrated PCB) listed in the PCB register U:\PCBs
   This is managed on the Scheduled PCB Removal Program.

5.2.2 PCB Testing

1. Test all equipment that has a greater than 1% chance of containing scheduled material (type 1 equipment) results are presented on U:\PCBs\
2. Test all equipment that less than 1% chance of containing scheduled material (type 2 and type 3 equipment), at the time of maintenance, repair or disposal.

5.2.3 PCB Storage, Transport, Disposal and Emergency Response

Store, transport, dispose and respond to emergencies in accordance with this Management Plan and the following categories:

- PCB free (equipment purchased after 1997 or equipment identified as such by testing)
- Non Scheduled PCB Material (equipment type 3 and type 2 or equipment identified as such by testing)
- Non Scheduled PCB Waste (equipment type 3 or equipment identified as such by testing)
- Scheduled PCB Material (equipment type 1 or equipment identified as such by testing)
- Scheduled PCB Waste (equipment type 1 and type 2 or equipment identified as such by testing)
- Concentrated PCB Material/Waste

5.2.4 PCB Small Equipment

Collect and manage as Scheduled PCB waste at the end of their useful lives:

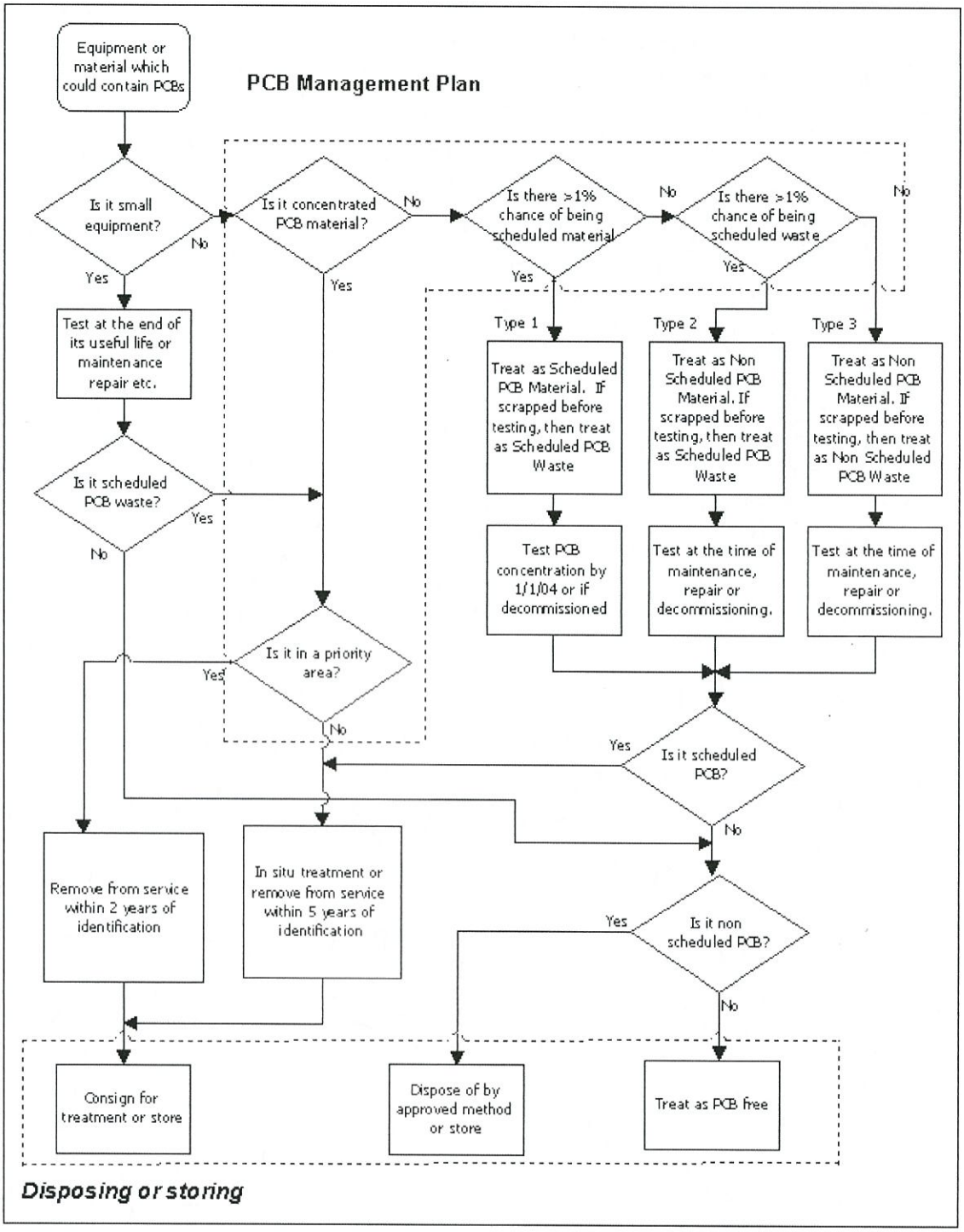
- Small equipment (such as lighting or other similar sized capacitors), containing greater than 50mg/kg which in aggregate contains greater than 50g or PCB at any one premises

Assume lighting capacitors contain PCBs unless they have a plastic case or are labelled 'PCB free'. Contact Environmental Services for advice.

5.2.5 PCB Notification

Provide written notification in the form of a progress report to the EPA. The notification will provide details of the identity, amount and location of scheduled PCB material or waste kept on Ausgrid premises (where material or waste is greater than 10kg). This notification will be provided on an annual basis in accordance with Ausgrid's PCB licence.

Figure 1 Flow diagram of PCB classification and management in accordance with the Risk Management Plan



6 Roles and responsibilities

6.1 Executive Manager – Maintenance & Replacement Management

The Executive Manager – Maintenance & Replacement Management shall provide the necessary resources for Transmission & System Operations (TSO) and Distribution, Operations and Reliability (DOR) to carry out work in accordance with this plan.

6.2 Executive General Manager – T&SO and DO&R

The Executive General Managers for Transmission and System Operations (T&SO) and Distribution Operations and Reliability (DO&R) divisions shall ensure the implementation of procedures for the identification, storage and disposal of PCB affected equipment.

They shall also arrange for the instruction of all employees associated with the work.

6.3 Manager – Environmental Services

The Manager – Environmental Services shall ensure changes in legislation are reflected in the PCB Management Plan, Oil Handling and Spill Response Guidelines and training courses.

6.4 Executive Manager – Property

The Executive Manager – Property shall ensure that lighting capacitors in Ausgrid premises are managed in accordance with this plan.

6.5 Manager – Network Test

The Manager – Network Test shall maintain the PCB register in accordance with this plan.

7 Handling PCB Contaminated Oil and Waste

7.1 General Handling of PCB Contaminated Oil and Waste

PCB contaminated oil and waste, including scrapped equipment, must be labelled, stored and transported in accordance with *EG100: Oil Handling and Spill Response Guidelines*.

For OH&S requirements relating to handling PCB material and PCB waste you should consult with your OH&S Representative and refer to DG70 which provides an up-to-date and concise guide for Ausgrid employees to follow when handling or working on or near any item containing oil.

7.2 Disposal of PCB Oil and Waste Equipment

PCB oil and waste equipment must be disposed of in accordance with the conditions of a license. Ausgrid does no hold such a licence and external licensed companies are used for non-scheduled PCB waste treatment/disposal.

PCB contaminated oil and waste, including scrapped equipment, must be disposed of in accordance with *EG100: Oil Handling and Spill Response Guidelines*.

7.3 Waste Classification

PCB contaminated oil or materials (scheduled and non-Scheduled) has the following waste classification:

7.3.1 Materials

Materials include items such as electrical equipment contaminated with PCBs.

Table 2 Waste details for PCB materials

Descriptor	Classification
Contaminant (1)	Petroleum Hydrocarbons
Contaminant (2)	PCB
Waste Origin Code (ANZSIC)	D3610
Waste Code	M100
Physical Nature	Liquid
Waste Class	Hazardous
Dangerous Goods	Class 9 (Scheduled only)
Shipping Name	Polychlorinated Biphenyl's
UN No.	2315
Packing Group	NO II

7.3.2 Liquids

Liquids include oil contaminated with PCBs

Table 3 Waste details for PCB liquids

Descriptor	Classification
Contaminant (1)	Petroleum Hydrocarbons
Contaminant (2)	PCB
Waste Origin Code (ANZSIC)	D3610
Waste Code	M100
Physical Nature	Liquid
Waste Class	Liquid
Dangerous Goods	Class 9 (Scheduled only)
Shipping Name	Polychlorinated Biphenyl's
UN No.	2315
Packing Group	NO II

7.3.3 Waste tracking

Refer to *EG120: Waste Guidelines* for waste tracking requirements.

8 Soil contamination

Soil is PCB contaminated if the soils, or concrete or bricks present in the soils contain PCBs at concentration levels above 2mk/kg

NOTE: There is a legal distinction between soil, which has been removed from site, and soil, which remains in the ground, i.e. there are additional requirements under other Acts for soil, which remains in the ground. Contact Environmental Services for more information.

9 Servicing and Removing PCB Light Fittings

9.1 General

The following procedures apply to the servicing or removal of existing light fittings in buildings and substation and street lighting equipment (where applicable):

1. Assume that all fittings (including choke boxes where separate) are fitted with capacitors.
2. Assume that all capacitors contain PCB unless they have a plastic case or are labelled "PCB free"
3. Promptly report and/or rectify any fitting leaking an oily liquid
4. Assume that any oily liquid found leaking is PCB and adopt the precautions detailed in the section below on removal
5. Except where specified in item (6), DO NOT remove or replace a capacitor unless it is leaking
6. If a leaking fitting is found in a building or substation, treat all other fittings in the room as if they are leaking and remove or replace their capacitors.

Note: In large open-plan office areas, a room is defined as an area of approximately 100 sq. m which will generally contain about 25 fittings.

9.2 Removal Procedure

1. Fit the appropriate PPE and be aware of appropriate cleaning and washing requirements. For OH&S requirements relating to handling PCB Material and PCB waste you should consult with your OH&S Representative or refer to DG70.
2. Examine the capacitor for leaks. If leaks are identified place the capacitor and any l contaminated rags in a heavy-duty plastic bag (heavy-duty garbage bag or similar).
3. If the tank is intact, the capacitor need not be store in a storage drum.

NOTE: Rags or other items affected by suspected PCB must be taken to an appropriate storage area. They cannot be disposed of as household garbage.

4. Clean or disposal of all PPE and personal decontamination to the requirements as outlined by your OH&S Representative.
5. Arrange access and transport of waste to an appropriate storage area.
6. Record information as appropriate.

10 PCB Testing

PCB testing is carried out by Network Test – Insulation Assessment Laboratory (Contact 9410 5119) in accordance with NATA requirements. Network Test – Insulation Assessment Laboratory also maintains records of equipment tested recording, date of sample taken, details of equipment (including age where appropriate) and results of the PCB analysis. This information can be found in the directory u:\PCBs\. This is called the PCB register.

If a record does not exist in the PCB Register then an oil sample has not been tested for that equipment. An oil sample will be required to be tested for the equipment.

Field staff can carry out the collection of oil samples for PCB testing. This must be undertaken in accordance with the instructions directed by Network Test – Insulation Assessment Laboratory to meet the necessary NATA and regulatory requirements, these are detailed below in **Section 10.1** and **10.2**

10.1 Asset and Equipment Sampling

- PCB oil samples must be collected in clean jars. These can be supplied by Network Test – Insulation Assessment Laboratory.
- Only 70-100ml of oil is required for a PCB oil sample.
- Samples from equipment under maintenance, after an oil change, should be marked as such, so PCB testing would be conducted automatically.
- Ensure any water is drained from equipment prior to collecting oil samples for testing.
- Any sample jars must be labelled either on the jar or with a tied cardboard label Labels must include the following information:
    - Substation number and the name
    - Equipment type
    - Serial number plus CRN
    - Where appropriate the phase (for example CTs); and
    - Date of sampling
- If oil has been drained from equipment into drums then the sample tag must include details sufficient to identify the drum, location and where the oil came from.
- Samples must be delivered to the laboratory within 2 weeks of the sample date.
- Oil sample results will be made available within 5 working days of the receipt of the sample.
- Allowances can be made for equipment failures and emergency works.

Note: Samples which do not meet the above requirements may be rejected by the Network Test – Insulation Assessment Laboratory.

10.2 Oil Containment Tank Sampling

- PCB oil samples must be collected in clean jars. These can be supplied by the Network Test – Insulation Assessment Laboratory.
- Samples must be collected in 1L sample jars.

- An oil sample is to be collected from the top of the tank and a water sample is to be collected from the bottom of the tank.
- Any sample jars must be labelled either on the jar or with a tied cardboard label. Labels must include the following information:
  - Substation number and the name
  - Date of sampling
- Samples must be delivered to the laboratory within 2 weeks of the sample date.
- Oil sample results will be made available within 5 working days of the receipt of the sample
- Allowances can be made for equipment failures and emergency works.

Note: Samples which do not meet the above requirements may be rejected by the Network Test – Insulation Assessment Laboratory.

11 Environmental Management Plan

Ausgrid is committed to minimising the environmental risk associated with PCB contaminated oil and equipment. As such Ausgrid has implemented a number of measures described in this plan which are aimed at effectively managing this environmental risk.

Table 4 Polychlorinated Biphenyls Environmental Management Plan

Objectives	Performance Target	Management Strategy	Performance Measures	Section Responsible	2012-2013 Target
Aspect **1. PCB Management in accordance with PCB National Management Plan**					
Remove Scheduled and Non-Scheduled PCB in accordance with the PCB Management Plan.	Scheduled PCB removed in accordance with the CCO and Ausgrid PCB Licence Number 53.	1.1 Period contract for the collection, treatment and disposal of PCB waste.	1.1.1 Maintain existing PCB waste period contract.	Environmental Services.	Annual review completed by 1 June 2013.
			1.1.2 Review contractor documentation (Insurances and Safety documentation) and undertake site visits of contractors processes as required.	Environmental Services.	Annual review completed by 1 June 2013.
		1.2 Light fitting capacitor (street & office) removal complies with PCB Licence.	1.2.1 Light fitting capacitor are managed in accordance this management plan	Environmental Services.	Ongoing.
		1.3 Maintain PCB Management Plan.PCb	1.3.1 PCB Management Plan is updated annually.	Environmental Services.	Annual Review Completed.
		1.4 PCB material and waste is conveyed in accordance with Licence Number 53.	1.4.1 PCB material and waste is conveyed in accordance with Licence Number 53.	Appropriate Ausgrid Staff.	Ongoing.

Objectives	Performance Target	Management Strategy	Performance Measures	Section Responsible	2012-2013 Target
			1.4.2 Document the ADG requirements for Ausgrid staff transporting PCB waste.	Environmental Services.	Include ADG transport requirements for Ausgrid staff transporting PCB waste in EG100.
Aspect **2. PCB Management in accordance with the Chemical Control Order and PCB Licence**					
Ausgrid maintains a PCB licence under the CCO and no non-compliances reported annually.	Ausgrid maintains a PCB licence under the CCO and no non-compliances reported annually.	2.1 Training for Ausgrid employees who handle PCB oil.	2.1.1 All Ausgrid employees who handle PCB contaminated have appropriate oil spill response training.	Environmental Services.	Ongoing.
		2.2 Environmental Guidelines contain current information on managing environmental incidents involving PCB spills.	2.2.1 Maintain Environmental Guideline 100 Oil Handling and Spill Response.	Environmental Services.	Ongoing.
		2.3 Regional supervisors responsible for oil handling hold a copy of the PCB licence.	2.3.1 Appropriate Ausgrid staff hold a current copy of the PCB licence. The current licence is also stored on EMShare.	Environmental Services, Appropriate Ausgrid Staff	Ongoing.

Objectives	Performance Target	Management Strategy	Performance Measures	Section Responsible	2012-2013 Target
		2.4 Appropriate personal protective equipment, clean-up material and equipment to deal with any spill is available wherever the PCB wastes and/or PCB materials are handled.	2.4.1 Appropriate oil spill kits are located at all PCB waste storage areas.	Environmental Services, Appropriate Ausgrid Staff, Depot Managers.	Ongoing.
		2.5 Submit an annual report to EPA on the compliance with PCB Licence Number 53.	2.5.1 Submit an annual report to EPA on the compliance with PCB Licence Number 53.	Environmental Services.	Annual report submitted by 13 August 2013.
		2.6 PCB Waste is stored in an appropriately bunded facility.	2.6.1 PCB waste is stored in an appropriately bunded facility.	Environmental Services, Appropriate Ausgrid Staff, Depot Managers.	Ongoing.
			2.6.2 PCB storage areas reviewed and inspected to ensure storage in accordance with PCB CCO.	Environmental Services.	Complete on audit of a PCB storage facility. Review storage areas in relation to the Environmental Civil Works Program.
		2.8 Stored PCB waste is appropriately labelled.	2.8.1 Stored PCB waste is appropriately labelled.	Environmental Services, Appropriate Ausgrid Staff	Ongoing.
		2.8 Environmental Incidents are managed in accordance with EG001 Incident Response.	2.8.1 Environmental Incidents are managed in accordance with EG001 Incident Response.	Environmental Services.	Ongoing.

Objectives	Performance Target	Management Strategy	Performance Measures	Section Responsible	2012-2013 Target
3. Aspect **Ausgrid Assets**					
Survey of PCB concentrations of oil within oil filled equipment in compliance with the National PCB Management Plan.	Compliance with the National PCB Management Plan.	3.1 Equipment survey and PCB testing meet the requirements of the National PCB Management Plan.	3.1.1 Equipment survey and PCB testing meet the requirements of the National PCB Management Plan.	Environmental Services, Network Test - Insulation Assessment Laboratory.	Complete a review of the PCB Survey
A register of PCB concentrations in Ausgrid's assets is maintained.	A register of PCB concentrations in Ausgrid's assets is maintained.	3.2 PCB Register is maintained and accessible to all Ausgrid staff.	3.2.1 PCB Register is maintained and accessible to all Ausgrid staff.	Network Test - Insulation Assessment Laboratory.	Ongoing.
			3.2.2 Include PCB concentrations of equipment in SAP.	Network Test - Insulation Assessment Laboratory Environmental Services Maintenance & Replacement Planning.	PCB Concentrations for equipment recorded in SAP.
Systems spare assets comply with the PCB CCO.	System spare assets do not contain PCBs	3.3 Review PCB concentrations for system spare assets	3.3.1 Review of insurance and system spare assets for PCB contamination.	Environmental Services Maintenance & Replacement Planning.	Review of insurance and system spare assets for PCB contamination completed and PCB contaminated equipment identified.

12 References

- AS 1216. Class labels for Dangerous Goods.
- Guideline for the Management of Materials containing Polychlorinated Biphenyl's (PCBs) below fifty milligrams per kilogram, 1994. – Discontinued.
- Australian Code for the Transport of Dangerous Goods by Road and Rail - Fifth Edition (ADG Code).
- National Polychlorinated Biphenyl's Management Plan - Australian and New Zealand Environment and Conservation Council (ANZECC), April 2003.

13 Related documents

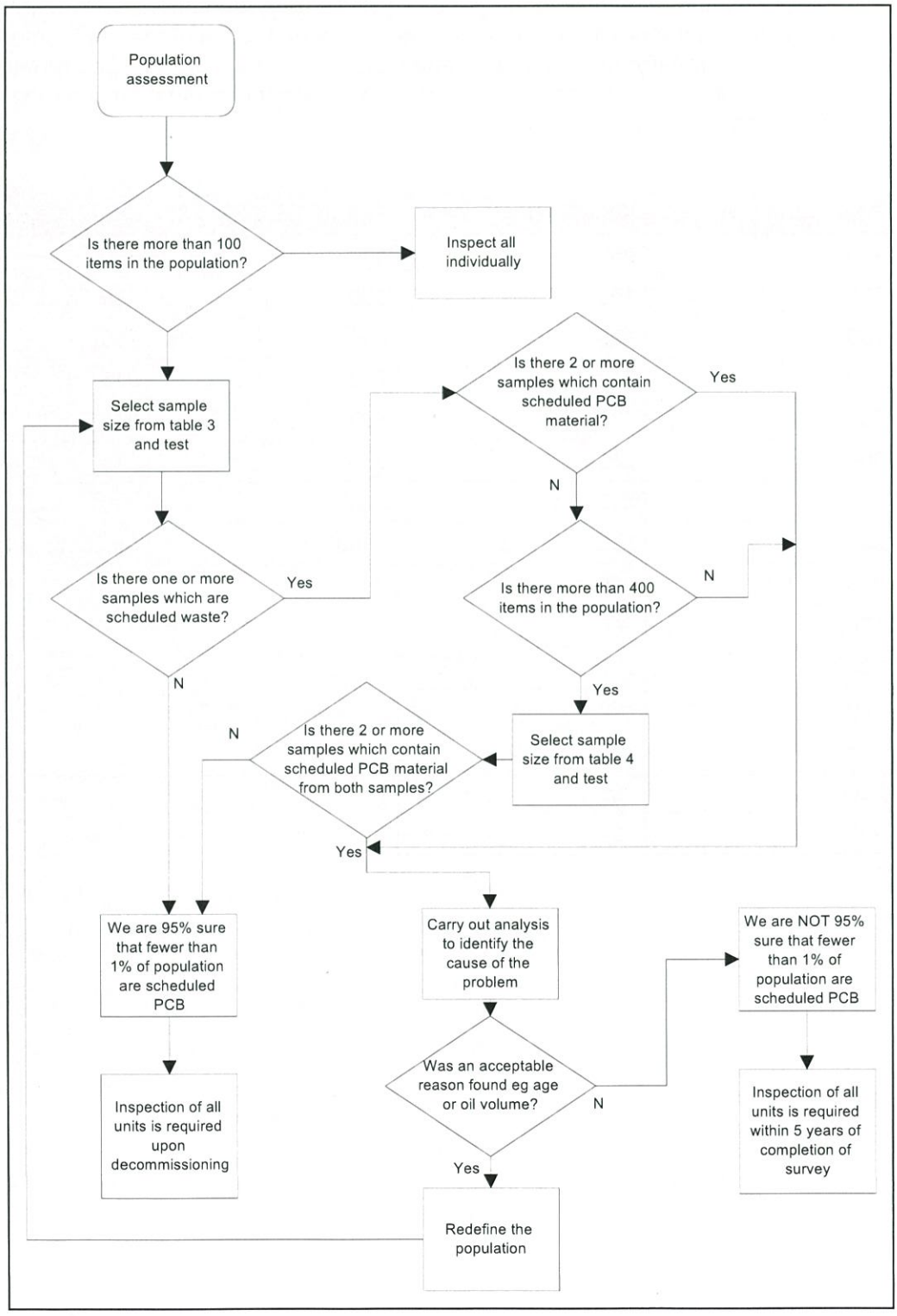
- NUS174 Environmental Handbook
- EG001 Environmental Incident Response Procedure
- EMS350 Environmental Management Strategy Oil Filled Equipment
- EG 100 Environmental Guidelines Oil Handling and Spill Response
- EG 110 Transformer, Transformer Oil and Cable Oil Storage Policy
- DG70 Occupational Health & Safety - Oil Handling Guideline
- Be Safe HG-06 Electrical Insulating Oil Hazard Guideline

Appendix A Determining PCBs – without samples

Procedure for determining if less than 1% of units contain Scheduled PCB material – WHERE SAMPLES HAVE YET TO BE TAKEN.

The procedure for determining if a population has a probability of 1% or less of containing Scheduled PCB material is shown in the following flow diagram.

Figure 2 Population assessment for 1% criteria



Notes on flow diagram:

- The method is used to classify units as either conforming or non-conforming.
- The method assumes the population is as homogeneous as possible. Reasonable criteria for grouping units include type, volume of oil, and age.
- The method assumes that samples are completely random. The sampling of conveniently located units is not appropriate.
- The sample sizes are independent of the actual definition of non-conforming units. Therefore a conformance criterion of say 'PCB free' would still use the same sample size.
- If a population of units is found to be unsatisfactory, then efforts will need to be made to find the reasons. For example, it may be that all of the non-conforming units were transformers above a certain size that are of similar age and were last serviced at around the same time. In such a case the population could be redefined

Population Size	Sample Size 1	Population Size	Sample Size 2
100	95	400	150
200	155	500	180
300	190	600	200
400	210	700	215
500	225	800	225
600	235	900	235
700	245	1000	245
800	250	>1000	As above in table 1
900	255		
1000	260		
2000	275		
5000	290		
10000	295		
20000	295		
>=50000	300		

Appendix B Determining PCBs – with samples

Procedure for ensuring we can be 95% sure that less than 1% of units contain Scheduled PCB material – WHERE SAMPLES HAVE PREVIOUSLY BEEN TAKEN.

The method described below will be useful in determining whether a certain type of equipment is likely to have fewer than 1% containing Scheduled PCBs. The only information required is the total number of items tested, n, and the number of observations, x, where PCBs were below 50 mg/kg, and the amount was less than 50 grams.

As long as $n\hat{p} \geq 5$, and $n\hat{q} \geq 5$, then this method can be used.

$$LIMIT = \hat{p} - z\sqrt{\hat{p}\hat{q}/n}$$

where

$z = 1.645$ *for a 95% Confidence Interval for* $n > 1000$, *for other values see the table below*

$n =$ *number of items tested*

$x =$ *the observed number of successes.*

$\hat{p} = x / n$

$\hat{q} = 1 - \hat{p}$

By substituting in the values, the LIMIT will be determined. This tells us:

"We can be highly confident (95% confidence interval) that at least LIMIT% of all the transformers will not contain Scheduled PCB material."

Example: Ausgrid has 27,000 distribution transformers. 4402 of these have been tested, of these 15 were found to contain more than 50 mg/kg of PCBs.

$n = 4402$

$x = 4387$

$\hat{p} = x / n = 4387 / 4402 = 0.9966$

$\hat{q} = 0.0034$

$z = 1.645$

$$LIMIT = 0.9966 - 1.645 * \sqrt{.9966 * 0.0034/4402} = .99515 = 99.5\%$$

So, we can be highly confident that at least 99.5% of all the transformers will not contain Scheduled PCB material.

Z-values for one-sided tolerance intervals for normal distributions

N	z
10	2.911
11	2.815
12	2.736
13	2.671
14	2.614
15	2.566
16	2.524
17	2.486
18	2.453
19	2.423
20	2.396
25	2.292
30	2.220
35	2.167
40	2.125
50	2.065
60	2.022
80	1.964
100	1.927
150	1.870
200	1.837
500	1.763
1000	1.727
∞	1.645

Optimising the sampling costs.

Based on the assumption that sampling, testing and recording N samples is N times more expensive than one sample, we can optimise the costs in the following manner.

If we are trying to determine if any items of equipment in the combined sample contain more than Xmg/kg of PCBs, we can calculate the optimum number of samples, (N), which should be combined and then tested as one sample. If the resulting concentration of this combined sample is less than X/N, then we can say that none of the original samples contain greater than Xmg/kg of PCBs.

To determine the optimum number of samples requires knowledge of the probability that a given combination of samples will contain greater than X/N mg/kg of PCBs. This requires standard deviations and the efforts of an experienced statistician. This option may be investigated further if the situation demands.

Example: If we combined the samples from 10 distribution transformers into one sample and tested the concentration of PCBs to be less than 0.2 mg/kg (2/10 i.e. X/N) then we could say all the 10 transformers are PCB free.

NOTE: There is a maximum sample size that can be used.

Appendix C PCB labelling requirements

Labelling Requirements – Scheduled PCB

The Class label applicable to Class 9 is shown in **Figure 3**. The size for the Class label is shown in the table below.

Net contents, L in the case of liquids, kg in the case of solids	Minimum size of class label mm^2	Minimum height of letters mm
0.5 – 5	20 x 20	3
5 – 25	50 x 50	5
>25	100 x 100	7

Where space available on the package for labelling is limited, the minimum height of the letters may be reduced to not less than half the stated size. The minimum size will be 1.5mm.

The marking of packaging shall be capable of passing the following tests:

1. not less than ten samples of the markings shall be applied or affixed to one or more of the packagings using the intended method of application or attachment;
2. The packagings shall be immersed in water at a temperature of 25°C ± 2°C for a continuous period of 4hrs, and
3. The packagings shall be removed from the water and dried.

The markings and means of applying or affixing them shall be deemed to pass the test if each of the markings on the packagings have remained completely affixed and the details on the labels are clearly legible and there has been no appreciable change in the colour of the Class labels.

Markings on the outer packaging of a package shall be located on the packaging so as to be normally visible when the package is stacked with other packages of the same kind.

The surface immediately surrounding every Class Label on a package shall be of a colour contrasting with the background colour or colours of the label. A dotted line surrounding the label is adequate to create contrast.

The Emergency Information Panel applicable to Class 9 is shown in **Error! Reference source not found.**.

Labelling Packages/Containers – Scheduled PCB

All packages containing greater than 2L of PCB liquid or greater than 2kg of PCB solid shall be clearly marked on the outside surface with:

1. 'POLYCHLORINATED BIPHENYLS'
2. 'UN2315'
3. 'Packaging Group II'
4. Class 9 Class label (See **Figure 3**)
5. Name and address of manufacturer, agent, or consignor of the dangerous goods.

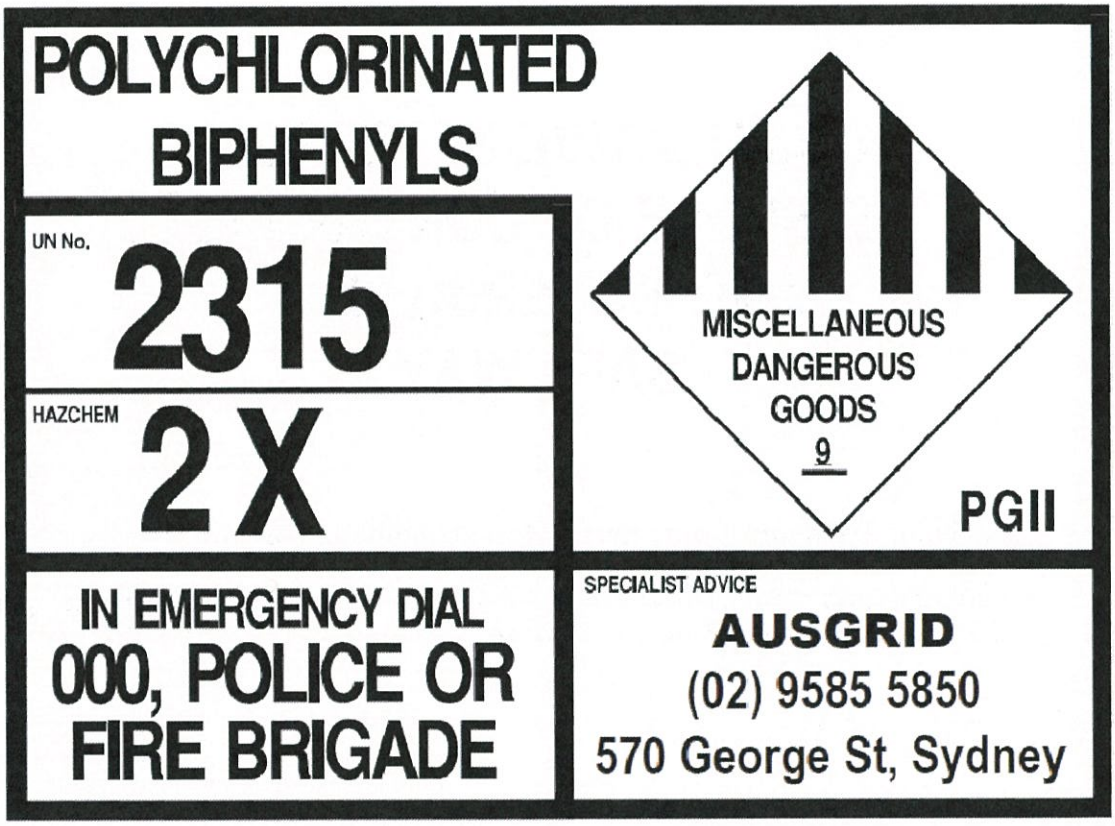
All inner packages which contain greater than 2L of PCB liquid or greater than 2kg of PCB solid shall be clearly marked with:

1. 'POLYCHLORINATED BIPHENYLS'
2. Class 9 Class label (See **Figure 3**).

Every combination or sole package containing in excess of 20L, or 20kg of PCBs, in addition to the markings above, the containers shall be clearly marked with:

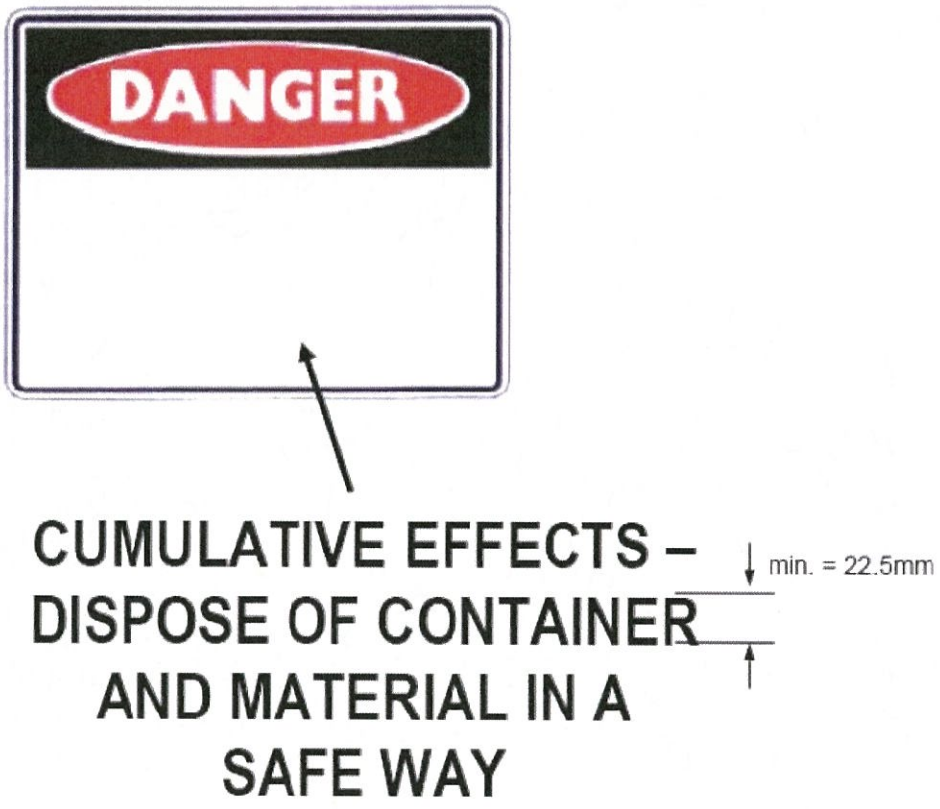
1. Information contained on the Emergency Information Panel (See **Figure 3**)

Figure 3 Scheduled PCB label



If the contents of the container are greater than 1% PCB, then the container shall be clearly marked with:

1. Danger cumulative effects
2. Dispose of container and material in a safe way



Labelling Packages/Containers – Non-scheduled PCB

Further details of PCB labelling requirements are detailed in environmental guideline *EG100 – Oil handling and spill response*

Ausgrid

Environmental Management Strategy

Contaminated Land

EMS 625

Version 3

12 Nov 2014

Document control

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Document history

Version	Summary of changes	Author
2.1	Initial version issued as in interim document.	
2.2	Interim issued for consultation - New structure, CLM Act reporting for cables, improved flowchart, adjusted actions and funding / remediation provision.	Michelle Exton
3	Funding, updated guideline references	Michelle Exton

Disclaimer

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to ensure that work practices are adequately managed in accordance with environmental legislative requirements.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this guideline.

This guideline is not authorised for external distribution and does not attempt to cover safety requirements.

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Contents

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Executive summary

This document outlines how Ausgrid complies with the requirements of the *Contaminated Land Management Act 1997*.

Due to the nature of Ausgrid's construction and operational activities there lies the potential for the contamination of infrastructure and property. Ausgrid's depots and substations are potentially contaminated with heavy metals, PCBs, asbestos, PAHs, TPHs and other contaminants, primarily from historical operations.

The objectives of the management strategy include:

- To manage Ausgrid sites appropriately.
- To assess that Ausgrid's properties are suitable for the relevant land use.
- To report trigger level exceedances to the environmental regulator.
- To eliminate immediate risks of offsite contamination, or to human health or to the environment.
- To outline accountabilities within Ausgrid for the management of contamination.
- To manage contaminated land with regard to the principles of ecologically sustainable development.
- To manage Ausgrid's construction activities minimising the risk of contamination as a result.

The management of contaminated land is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures including the development of the Contaminated Land Priority List, dedicated contaminated land investigation program, remediation of contaminated land identification of known contamination issues on the Environmental GIS and environmental planning processes to identify contamination in the field.

Glossary

Term	Meaning
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid sulphate soils: are naturally occurring sediments and soils containing iron sulphides (principally pyrite) and/or their precursors or oxidation products. This includes actual and potential acid sulphate soils. Both can be found within the same soil profile.
BSP	bulk supply point
Bund	An impervious barrier to retain liquid.
CCO	Chemical Control Order
CLM Act	*Contaminated Land Management Act 1997*
DA	Development Application
DECC	Former Department of Environment and Climate Change (now OEH)
DECCW	Former Department of Environment, Climate Change and Water (now OEH)
DG	Ausgrid's distribution guideline
EIL	Ecological Investigation Level
EHC Act	*Environmentally Hazardous Chemicals Act 1985*
EGOWS	enhanced gravity oil water separator
EIA	environmental impact assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW).
EP&A Regulations	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority (part of OEH)
EPI	Environmental planning instruments: made under Part 3 of the EP&A Act.
HIL	Health investigation level
NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
NHMRC	National Health and Medical Research Council
OCP	organochlorine pesticides
PAH	Polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
SEPP	State environmental planning policy: a type of EIP made under Part 3 of the EP&A Act.
STS	Sub-transmission substation
TPH	Total petroleum hydrocarbon
UPSS	Underground petroleum storage system
Zn	zone substation

1 About this document

This document outlines how Ausgrid manages contaminated land and complies with the *Contaminated Land Management Act 1997* (CLM Act) and the EPA *Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997* (EPA Guidelines).

1.1 Scope

The strategy applies to all Ausgrid owned land and Ausgrid activities on easements and leased properties. The strategy provides guidance on the identification, notification and management of contaminated land.

The strategy does not cover the process for undertaking contaminated land investigations, the management of environmental incidents or contaminated land issues relating to third party sites.

The strategy aims to:

- minimise Ausgrid's liability in relation to the requirements of the CLM Act, the *Protection of the Environment Operations Act 1997* (POEO Act) and other relevant legislation
- meet Ausgrid's obligations under section 60 of the CLM Act (Duty to Report)
- ensure no unacceptable immediate risks of off-site contamination, or to human health or the environment
- ensure appropriate consideration is given for land zoning and use for Ausgrid assets and projects.

The objectives of the management strategy include:

- to prevent or minimise air pollution, water pollution, noise pollution and land pollution
- to establish a process for investigating, managing and (where appropriate) remediating land
- To manage Ausgrid sites appropriately
- To assess that Ausgrid's properties are suitable for the relevant land use.
- To report trigger level exceedances to the environmental regulator
- To eliminate immediate risks of offsite contamination, or to human health or to the environment
- To outline accountabilities within Ausgrid for the management of contamination
- To manage contaminated land with regard to the principles of ecologically sustainable development.

1.1.1 Audience

This strategy has been prepared for Ausgrid staff involved in the identification, notification and management of contaminated land. The core audience includes Environmental Services, Property Portfolio and Transmission Services.

2 Background

Ausgrid is one of the largest electricity networks in Australia covering an area of 22,275 square kilometres, distributing electricity to Sydney, Central Coast and Hunter Regions.

Owned by the NSW Government, Ausgrid provides electricity to 1.6 million customers in both rural and urban areas and include small to large businesses and industries such as mining, shipping, tourism, manufacturing and agriculture.

Due to the nature of Ausgrid's operational activities there lies the potential for the contamination of property and infrastructure. Ausgrid's depots and substations are potentially contaminated with heavy metals, polychlorinated biphenyls (PCBs), asbestos, poly aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs) and other contaminants.

Throughout its distribution area, Ausgrid has an extensive network of major and minor substations. Major substations refer to sub-transmission and zone substations. Minor substations refer to distribution substations which include pole top transformers, chamber type substations and street kiosks. Ausgrid operates and maintains the network based at various office and depot facilities across the network area.

Ausgrid's electricity network comprises:

- 500,000 million wooden poles (treated to control damage from pests and rot)
- over 230 sub-transmission and zone substations (typically three large oil filled transformers, current transformers, voltage transformers and oil filled switchgear on site. Potential for PCB and mercury contamination.)
- over 30,000 distribution substations (typically contain between 100L to 900L of oil) including kiosk and pole type substations
- 68 depot and office facilities (large field depots contain oil and fuel storage facilities, USTs, building containing asbestos)
- 420 km of fluid filled underground cables (refer to *EMS 300 Environmental Management Strategy Underground Transmission Cables*).

2.1 Legal requirements

2.1.1 Protection of the Environment Operations Act 1997 (POEO Act)

The POEO Act outlines the main pollution control legislative obligations for NSW. The purpose of the POEO Act is primarily to prevent or minimise air pollution, water pollution, noise pollution and land pollution through a system of licensing and regulations. Enforcement mechanisms include prosecution by the Environment Protection Authority (EPA) or by the issuing of environment protection notices by the EPA.

There are also severe penalties under the POEO Act for failing to notify of pollution events and further daily penalties for each day the incident goes unreported.

2.1.2 Contaminated Land Management Act 1997 (CLM Act)

The general objective of the CLM Act is to establish a process for investigating, managing and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to warrant regulation.

Under section 60 of the CLM Act, a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify the EPA when they become aware of the contamination and in accordance with the EPA Guidelines.

Under section 6 of the CLM Act, a person who is responsible for contamination continues to be responsible for that contamination. Any contractual agreement, sale transaction or cessation of occupation does not change the meaning of this section.

2.1.3 Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2008 (UPSS)

Where a site has underground petroleum storage systems, there is a higher potential for leaks to go undetected if regular checks and integrity testing is not performed. The UPSS Regulation requires owners and operators to regularly check for leaks in the fuel tanks and pipes used to store and handle petroleum products. They also need to meet a set of minimum standards in their day-to-day environmental management of these storage systems.

2.1.4 Environmentally Hazardous Chemicals Act 1985 (EHC Act)

The EHC Act controls the generation, storage, transport and disposal of hazardous chemical wastes in NSW. Under the EHC Act, the EPA issues individual Chemical Control Orders (CCOs) to control chemical wastes such as polychlorinated biphenyls (PCBs) and Organochlorine Pesticides (OCPs).

Ausgrid currently manages PCB materials and waste in accordance with *EMS 410 Environmental Management Strategy Polychlorinated Biphenyls*. OCPs are managed in accordance with *EMS 300 Environmental Management Strategy Underground Transmission Cables*.

2.1.5 State Environmental Planning Policy 55 (SEPP 55) – Remediation of land

SEPP 55 regulates the development on contaminated sites in NSW. The SEPP applies to all contaminated land including sites not regulated by the EPA.

In particular, the SEPP:

- establishes when a planning approval is (and is not) required to remediate or develop a contaminated site
- requires consent/determining authorities to consider any contamination when deciding whether to grant a planning approve to an activity
- requires notification to local councils for certain remediation work
- requires contamination to be taken into account in rezoning decisions.

The SEPP identifies two categories of remediation works:

Category 1 - requires planning approval

Remediation work which requires planning approval includes any work that is:

- designated development
- carried out on land that is declared to be critical habitat (for threatened species)
- likely to have a significant effect on critical habitat or a threatened species
- development which another SEPP says needs development consent; and
- development which will be carried out in an environmentally sensitive zone, such as a coastal area.

Category 2 - requires notification only

All other remediation work not covered in Category 1 does not require a planning approval, unless an exception applies. When undertaking Category 2 remediation works, 30 days written notice must be given to the council before starting the work.

In most circumstances Ausgrid carries out remediation work under Category 2 and is considered the determining authority for these remediation works.

2.1.6 Pesticides Act 1999

The *Pesticides Act 1999* controls and regulates the use of pesticides in NSW. The Act aims to reduce the risks associated with the use of pesticides to human health, the environment, property, industry and trade. It also aims to promote collaborative and integrated policies for the use of pesticides.

The EPA enforces the proper use of all pesticides in NSW, after the point of sale. This includes pesticide use in agriculture, on public lands and on domestic and commercial premises.

3 Management strategy

3.1 Investigating and remediating contaminated land

The management of contaminated land investigations and site remediation is undertaken by all Ausgrid staff in conjunction with Environmental Services according to Environmental Guideline *EG 180 Contaminated lands assessment*.

Ausgrid generally undertakes investigations using specialist contaminated land consultants for the following activities:

- land acquisitions, divestments, leases or other property transactions
- redevelopment of Ausgrid sites
- decommissioning substations, depots and other Ausgrid assets
- environmental incidents (refer to *EG 001Environmental incident response*)
- UPSS monitoring and removal
- sites identified as high risk on Ausgrid's Contaminated Land Priority List.

3.2 Funding contaminated land investigation and remediation

Ausgrid will fund investigations and remediation works based on the activities being undertaken:

- Investigation and remediation works undertaken as a result of works associated with due diligence for the sale of an Ausgrid asset, will be funded against the sale of the asset
- Investigation and remediation works undertaken as a result of redevelopment of Ausgrid sites will be funded against the project.
- Environmental incidents (uncovering unknown contamination, contamination from Ausgrid activities) on Ausgrid assets will be funded against the Remediation Provision
- Investigations associated with the contaminated land due diligence program or mitigating the risk of CLM Act prosecution will be funded as an operational cost against the asset.
- Investigation and remediation associated with leaking fluid filled cables will be funded as an operational cost against the asset.

3.3 Reporting contaminated land

3.3.1 Reporting pollution incidents under the POEO Act

The immediate notification requirements in relation to an environmental incident will be managed in accordance with *EG 001 Environmental incident response*, carried out by Environmental Services' Senior Environmental Officer - Pollution Control.

In accordance with Ausgrid's NUS174C, in the case of an environmental incident, including pollution incidents and discovering contamination, Environmental Services must be contacted immediately.

3.3.2 Reporting contaminated land under the CLM Act

General

Ausgrid's management of the Duty to Report Contamination will be managed in accordance with this Strategy, see Table 3-1. Section 60 of the CLM Act outlines the requirements for reporting activities that have contaminated land. Further details are provided within the EPA Guidelines. **Figure 4-1** can be used to determine when a Duty to Report may exist under the CLM Act.

When contamination is discovered, Environmental Services must be notified to ensure the appropriate Contaminated Site Investigation is undertaken. The Senior Environmental Officer – Projects shall assess the need for notification in accordance with the applicable EPA Guidelines.

Where required, Environmental Services shall prepare the NSW EPA Section 60 CLM Act Site Contamination Notification Form and associated documentation for approval by the Chief Operating Officer.

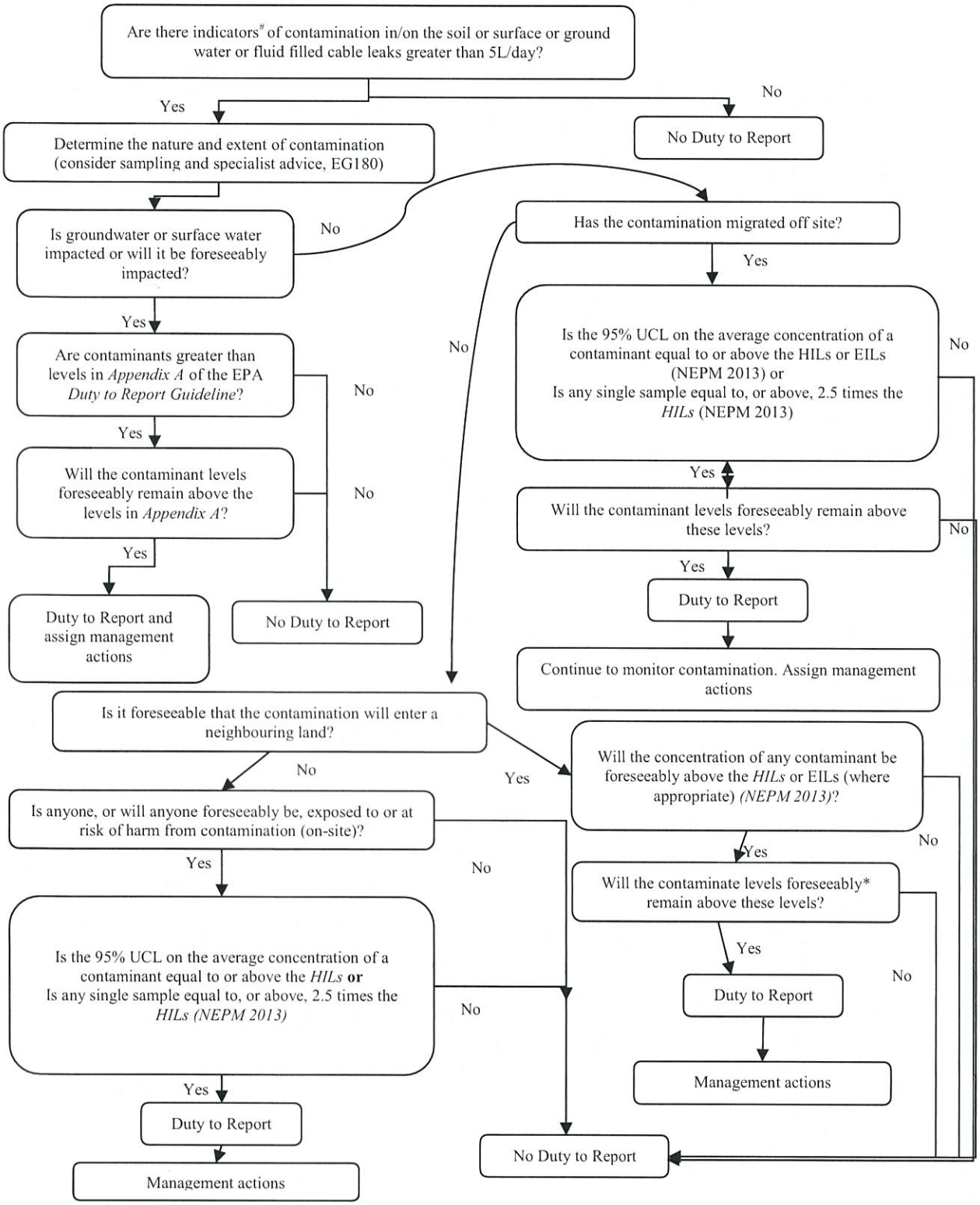
Table 3-1 Contaminated site notification process

Determine duty to report contamination	• Senior Environmental Officer - Projects • Manage detailed contamination investigation in accordance with EG 180 • Prepare site contamination notification form and associated documentation
Review notification form and associated documentation	• Manager - Environmental Services • Manager – Safety and Environmental Services • Manager – Health Safety and Environment • Review site contamination notification form and associated documentation
Notification form certification	• Chief Operating Officer • Certify site contamination notification form

Fluid filled cables

Fluid filled cable leaks of greater than 5L/day are reported to the EPA under the POEO Act 1997. There is not a requirement for immediate notification under the CLM Act, and Environmental Services will conduct investigations during the repair of the cable and management of the leak. Determination of CLM Act reporting will be based on the review of investigations, reports and specialist advice. Refer to *EMS 300 Environmental Management Strategy Underground Transmission Cables* for additional information.

Figure 4-1 Determining reporting requirements under s60 of the CLM Act



 # Indicators of contamination include:
- oil, fuel or chemical spills, staining or sheen on unsealed surfaces or affecting a waterway
- unusual odours from soil
- unusually coloured material

Dead or dying vegetation
- visible signs of toxic responses from flora and fauna
- discovering solid or liquid chemical wastes on or in soils
- the presence of illegal and/or uncontrolled landfills on site
- evidence of off-site migration of contaminants into adjacent or nearby environments.

Management actions include:
- Monitor
- Remediation
- Environmental management plan

-Risk assessment

Risk assessment

3.4 Contaminated land risk model

Ausgrid takes a risk-based approach to the management of contaminated land.

A contaminated land risk assessment model has been developed as an extension to the oil containment risk assessment model already in place for zone and STS substations. The Contaminated Land Risk Model incorporates contained oil and fuel volumes, pollution control systems installed (eg bunding), stored or in-service PCB contaminated oil, sensitivity of the receiving environment, number of known environmental incidents at the site, prior knowledge of contaminated land issues or whether a detailed contaminated land investigation has been undertaken.

The model ranks Ausgrid's properties in order of risk to the environment. This priority is used to allocate resources and programs of investigations as a part of the due diligence program.

4 Environmental management plan

Ausgrid is committed to minimising the environmental risk associated with contaminated land resulting from past and present operations/incidents. As such Ausgrid has implemented measures described in this plan aimed at effectively managing this environmental risk.

Table 4.1 outlines the contaminated land environmental management plan, including targets, responsibilities and the current action status.

Table 4-1 Contaminated land environmental management plan

Objectives	Performance target	Management strategy	Performance measures	Section responsible	Target
Aspect 1. Property - Substations and Depots (general)					
Understand and prioritise assessments and management of Ausgrid sites that may be contaminated	**1.1 -** Risk based management of contaminated land environmental site assessments.	**1.1.1 -** Maintain contaminated land risk model for Ausgrid sites	Risk Model and risk assessment prepared for all zone and STS substations, depots with oil & fuel storage.	Environmental Services	Ongoing
		1.1.2 - Maintain the register of prioritised sites requiring detailed site investigations	High risk sites defined and site investigation program developed.	Environmental Services	Ongoing.
		1.1.3 - Contaminated site investigations on highest priority sites.	Investigation program prioritises highest risk sites and synergises with current capital work programme.	Environmental Services and Property	Up to 5 sites completed each financial year.
		1.1.4 - Maintain a panel of specialist contaminated land consultants and accredited site auditors.	Specialist contaminated land consultants have relevant training and insurances maintained.	Environmental Services and Procurement	Ongoing.
		1.1.5 - Improve Environmental GIS identification of Ausgrid Contaminated Sites and Investigations.	Review Environmental GIS contaminated site records annually.	Environmental Services	Known Ausgrid contaminated sites recorded on the Environmental GIS.
Aspect 2. Property - Substations and Depots with known contamination					
Manage known contamination in accordance with legislation to minimise impacts on the environment	**2.1 -** Sites assessed, remediated (if required), reported (if required) and validated as suitable for current landuses and not presenting a risk of harm.	**2.1.1 -** Manage sites in accordance with EPA Guidelines.	All investigations undertaken in accordance with EG 180	Environmental Services	Ongoing.
		2.1.2 - Report sites identified as requiring reporting under the CLM Act (s60).	Sites investigated by specialist contaminated land consultants. All 'Duty to Notify' sites reported to EPA.	Environmental Services	Sites reported to EPA as required.
		2.1.3 - Regular review and update of Ausgrid's contaminated land guidance to ensure consistency with legislation and regulator guidelines.	Undertake review of EMS 625 and EG 180 with respect to current legislative requirements and update with current organisation structure.	Environmental Services	EMS 625 and EG 180 regularly reviewed and updated

Aspect 3. Poles						
Manage in accordance with NS145 Pole inspection and treatment procedures.	**3.1 -** Risk based approach to managing legacy pole treatment methods	**3.1.1 -** Manage in accordance with the Pesticides Act and CLM Act.	Document legacy pole treatment methods and management practices across NNSW.	Environmental Services	Draft paper prepared for consultation.	Not yet commenced
Aspect 4. Incidents resulting in contamination						
Ensure incidents are quickly controlled and contained to minimise impacts to the environment. Remediation works completed.	**4.1 -** Sites assessed, remediated (if required), reported (if required) and validated as suitable for current landuses..	**4.1.1 -** Manage in accordance with the POEO Act and CLM Act (if required).	All incidents managed in accordance with EG001. Required contaminated site investigations undertaken in accordance with EG 180.	All workers and Environmental Services	EG 001 and EG 180 kept up-to-date	EG 001 and EG 180 reviewed/updated as required.
		4.1.2 - Manage in accordance with the POEO Act and CLM Act (if required)	Workers liaise with Environmental Services for all environmental incidents.	All workers and Environmental Services	Ongoing.	As per Environmental Handbook and EGN 101. Typically 100 investigations completed each year
		4.1.3 - Manage in accordance with the POEO Act and CLM Act (if required).	Incidents recorded in incident register on EMShare.	Environmental Services	Ongoing.	Typically 100 investigations recorded in EMShare each year

Aspect 5. Purchase of new land or sale of existing land						
Maximise value and minimise liability	**5.1 -** Maximise value and minimise liability	**5.1.1 -** Site investigation in accordance with EPA Guidelines.	Effectively record contamination assessments on EMShare.	Environmental Services	Ongoing.	RFQ templates and EG180 updated to reflect legislative changes as required.
		5.1.2 - Undertake environmental assessments prior to purchasing land.	Effectively record contamination assessments on EMShare.	Environmental Services and Property	Ongoing.	RFQ templates and EG180 updated to reflect legislative changes as required
Aspect 6. Development of existing land						
Manage sites in accordance with the EP&A Act and CLM Act.	**6.1 -** Manage sites in accordance with the EP&A Act and CLM Act.	**6.1.1 -** Environmental Impact Assessment undertaken in accordance with NUS 174. EIA specifies requirements for specialist contaminated land investigation.	Effectively record contamination assessments on EMShare.	Environmental Services, Planners and Contestability	Ongoing.	NUS174 updated to reflect legislative changes as required.

5 References

- ANZECC Australian and New Zealand Water Quality Guidelines 2000
- *Contaminated Land Management Act 1997*
- *Environmental Planning and Assessment Act 1979*
- Guidelines on the Duty to Report Contamination under the CLM Act, June 2009.
- *Protection of the Environment Operations Act 1997*
- *NEPM* National Environment Protection (Assessment of Site Contamination) Measure 1999

6 Related documents

This document refers to:

- EMS 300 Environmental management strategy underground transmission cables
- EMS 350 Environmental management strategy oil filled equipment
- EMS 410 Environmental management strategy polychlorinated biphenyls
- NUS 174C Environmental Handbook for Construction and Maintenance
- EG 001 Environmental incident response procedure
- EGN 101 Oil spill containment and clean up guide
- EG 180 Contaminated lands assessment.
- EG 100 Environmental guidelines oil handling and spill response

Environmental Management Strategy

Sulfur Hexafluoride (SF6)

EMS 920

Version 2.0

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Contents

Executive summary

This document outlines the management of Sulfur Hexafluoride (SF_6) gas filled equipment and related products within Ausgrid. The strategic benefit of developing procedures and objectives in relation to SF_6 equipment handling, limits the inherent risk associated when operating high value assets containing a potent greenhouse gas.

With the introduction of the carbon pollution reduction scheme it is important that Ausgrid strives to establish industry leadership in regards to the handling of SF6 gas and equipment in order to achieve a safe, responsible and environmentally friendly culture within the organisation.

This strategy evaluates the various key participants within Ausgrid who have an active relationship with SF_6 filled equipment and gas. Providing a clear action plan for developing organisational handling procedures, a responsible procurement culture, operational risk assessments and so on.

The Strategy targets Include:

- Capturing sufficient data to meet National Greenhouse and Energy Reporting System (NGERS) requirements
- Evaluating the use of new SF_6 filled equipment being used within Ausgrid's network
- Prevent further purchasing of SF_6 filled equipment with known leaks and/or premature failures
- Ensuring SF_6 gas can be removed from distribution equipment during the disposal process
- Minimising excess SF_6 gas in storage due to oversupply of SF_6 gas with new equipment
- Ensuring sub contractors are meeting Ausgrid's SF_6 handling and reporting requirements
- Consistency of handling SF_6 across the organisation
- Management of work health and safety (WH&S) issues related to handling SF_6 gas, equipment and storage facilities
- Minimising design and planning risks in addition to the loss of SF_6 due to equipment operation and/or failure
- Identifying and repairing leaks from operational equipment without delay
- Develop centralised well managed SF_6 storage facilities
- Minimise the storage risk by specifying a nominal volume of SF_6 in storage
- Minimise the release of SF_6 gas from equipment at the end of life/disposal process
- Manage waste associated with SF_6 filled equipment and gas
- Minimise the release of used SF_6 to the atmosphere
- Benchmarking SF6 management practices in line with or better than other electricity distributors using SF6 gas and equipment.

Glossary

Term	Meaning
C_2F_6	Perfluoroethane (hexafluoroethane)
C_3F_8	Perfluoropropane
C_4F_{10}	Perfluorobutane
C_5F_{12}	Perfluoropentane
C_6F_{14}	Perfluorohexane
CB	Circuit Breakers
C-C_4F_8	Perfluorocyclobutane
CCT	Covered conductor thick
CF_4	Perfluoromethane (tetrafluoromethane)
CIGRE	International Council on Large Electric Systems
Climate Change	Describes both changed average climatic conditions, such as increased temperature and lower average rainfall, as well as changes in the patterns of extreme events, including increased frequency and intensity of storms.
CO_2	carbon dioxide
DoCC	Department of Climate Change
EIA	Environmental Impact Assessment
ENA	Energy Networks Association
Environmental Impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from organisation activities, products or services.
GHG	greenhouse gas
GIS	gas insulated switchgear
GIS	Gas Insulated Switchgear
GIT	Gas Insulated Transformer
H_2SO_4	Sulfuric acid
HNF_4	Hydrofluoric acid
iAMS	Integrated Asset Management System
IPCC	Intergovernmental Panel on Climate Change
kV	kilovolts
kV	kilovolt
mg/kg	milligram(s) per milogram(s). For the purposes of this document, parts per million (ppm) can be considered the same as milligrams per pilogram (mg/kg).
MSDS	Material Safety Data Sheet
MVA	mega Volt Amps
N_2O	nitrous oxide
NGERS	National Greenhouse and Energy Reporting System
NHMRC	National Health and Medical Research Council
O_3	Ozone

OEH	Office of Environment and Heritage
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PPE	personal protective equipment
ppm	parts per million. For the purposes of this document, ppm can be considered the same as milligrams per kilogram (mg/kg).
ppmv	parts per million by volume
RMI	Ring Main Insulator
SDS	safety data sheet
SF_6	sulphur hexafluoride
SGG	synthetic greenhouse gas
SO_2	Sulfur dioxide
SOF_2	Thionyl Fluoride
STS	subtransmission substation
TLV	Threshold Limit Value
V	Volt: the unit of measure for voltage which is the pressure that electricity is pushed through the wire.
WH&S	Work Health and Safety
ZS	zone substation

1 About this document

The primary focus of this management strategy is to provide a framework for the safe and responsible use of Sulfur Hexafluoride (SF_6) within Ausgrid's network.

This interim version will be used for consultation with Ausgrid stakeholder groups. Following consultation of the management plan actions detailed in Section 5, the document will be reviewed and published.

1.1 Scope

This management strategy covers the management of environmental, health and safety, operational practices and the greenhouse gas emissions accounting and reporting structure applicable during the entire lifecycle of network assets containing SF_6.

Refer to NEG SM-09 for specific procedures related to the handling of SF_6 and SF_6 decomposition products, recommendations on training, maintenance operations on equipment containing SF_6, protective clothing and specific work functions such as preparing the equipment for gas evacuation.

Audience

This strategy evaluates the various key participants within Ausgrid who have an active role with SF_6 filled equipment and gas (refer to the Management Plan in Section 7). It provides a clear action plan for developing organisational handling procedures, a responsible procurement culture, operational risk assessments and so on.

2 Background

Throughout its distribution area Ausgrid operates an extensive network of SF6 insulated equipment, with approximately 15,891kg of SF_6 in service. This figure is forecast to increase as the network continues to grow and older equipment is replaced. In addition there is currently approximately 1,500kg in storage. Table 2-1 provides an estimate of the current SF6 equipment quantity and volume on Ausgrid's Network for each voltage in kilovolts (kV).

Table 2-1: *SF6 Gas Installed Equipment as of 01/7/08*

Voltage (kV)	Equipment Quantity (units)	Equipment Type	SF6 Volume (kg)
11	1415	Ring Main Isolator (RMI) Circuit Breakers (CB), Reclosers	2043
33	177	Dead Tank Circuit Breakers, Gas Insulated Switchgear (GIS)	518
66	53	Dead Tank CB, Live Tank CB	690
132	280	Live Tank CB, Dead Tank CB, GIS, Gas Insulated Transformer (GIT), Covered conductor thick (CCT) Switcher	12640
Total	**1925**	**Total**	**15891**

SF_6 is a synthetic gas, which in its pure state is stable, inert, colourless, odourless and non-toxic. The gas possesses exceptional thermal stability, high electric strength and arc quenching properties. Its non-condensing characteristics at low temperatures make for an excellent insulating medium for enclosed high voltage applications. For further details on SF6 properties refer to the following:

- Network Engineering Guidelines NEG SM09 Sulfur Hexafluoride (SF_6) [3]
- International Electrotechnical Commission IEC 60376 Specification of technical grade sulphur hexafluoride for use in electrical equipment [2]
- Australian Standard AS2791 High-Voltage switchgear and control gear – Use and handling of sulphur hexafluoride (SF_6) in high voltage switchgear [1]

In contrast, SF6 produces a greenhouse warming potential 23,900 times greater than carbon dioxide. Consequently with a likely increase in quantity of SF6 used throughout the network it is important Ausgrid establishes an appropriate management processes to reduce gas emissions to the atmosphere.

Predominately there are two types of gas filled enclosures used on Ausgrid's Network these are:

- Closed Pressure System – An assembly which is refilled only periodically by manual connection to an external gas source. The majority of transmission equipment within Ausgrid's network uses closed pressure systems eg 145kV Mitsubishi GIS
- Sealed Pressure System - An assembly which no further gas processing is required during the expected operating life. Sealed pressure systems are completely assembled, filled and tested during the manufacturing process. The majority of distribution equipment within Ausgrid's network uses sealed pressure systems eg 12kV RMICB ABB CTC

Where necessary and for the purpose of this management strategy the equipment will be divided into two specific categories. From Table 2-1 above it is apparent that there is a considerable difference in both the volume of SF6 within equipment of varying operating voltages and the number of units operating at these voltage levels. The two categories are as follows:

- SF_6 Transmission Equipment – Nominal Voltages 33kV and above, commonly closed pressure systems and typically the operating SF6 pressures are in the range of 5 -7 Bar.
- SF_6 Distribution Equipment – Nominal Voltages 11kV, commonly sealed pressure systems and typically the operating SF6 pressures are in the range of 0.5 to 3 Bar.

2.1 Legal requirements

2.1.1 Ozone Protection and Synthetic Greenhouse Gas Management Act

SF_6 is a synthetic greenhouse gas (SGG), listed under the Kyoto protocol, with a global warming potential of 23 900 times that of CO_2. It is one of the scheduled substances controlled under the Ozone Protection and Synthetic Greenhouse Gas Management Act (Commonwealth, 1989).

The Act controls the manufacture, import and export of a range of ozone depleting substances (ODS) and synthetic greenhouse gases in Australia. Discharge of scheduled substances is prohibited under the Act.

2.1.2 Protection of the Environment Operations Act

Waste SF_6 is classified as Hazardous Waste under the Protection of the Environment Operations Act and as such specific storage, transport and licensing requirements apply. For more information refer to EG120 Waste guidelines.

2.1.3 Work Health and Safety Act

SF_6 must be stored and handled in accordance with the Work Health and Safety Act 2011 and Regulation, including:

- notification to Workcover NSW for storage of Dangerous Goods in excess of Manifest quantities (10,000L for SF6; or 500L for contaminated SF6)
- labelling and signs where the quantity of Dangerous Goods exceed the Placarding quantity (1,000L for SF6; or 50L for contaminated SF6)
- liquid dangerous goods must be stored to eliminate the risk of a spill or leak entering the environment.

For further information refer to Be Safe Hazard Guideline 18: Workplace Substances.

2.1.4 Dangerous Goods (Road and Rail Transport) Act

Pure SF_6 gas is classified as a Dangerous Good Class 2.2 (non-flammable, non-toxic gas) in accordance with the Dangerous Goods (Road and Rail Transport) Act. Reclaimed SF_6 may contain decomposition products, including Hydrofluoric Acid (HF) and Thionyl Difluoride (F_2OS). In this case the gas is classified as a Dangerous Good Class 2.3 (toxic gas).

Requirements for Dangerous Goods under this Act include:

- licensing for a road vehicle and driver transporting Dangerous Goods in a receptacle with a capacity of more than 500L, or more than 500kg of dangerous goods in a receptacle
- placarding for a road vehicle transporting Dangerous Goods in a receptacle with a capacity of more than 500L, or more than 500kg of dangerous goods in a receptacle
- labelling of packages or containers, emergency preparedness and insurance requirements

For further information refer to Be Safe Hazard Guideline 18: Workplace Substances.

3 Issues

The primary issues regarding the use of SF_6 are concerned with the release of SF_6 into the atmosphere over the entire product lifecycle. These issues fall under two broad categories: the environmental impacts; and the health and safety aspects of exposure, due to leakage of SF_6 and associated impurities contained within the SF_6 system.

Leakage from electrical equipment should be minimised where possible due to a range of undesirable impacts including:

- Anthropogenic contribution of a powerful greenhouse gas to the atmosphere
- Economic costs associated with the purchase of replacement SF_6 gas;

- Potential interruption to supply from leaking SF_6 filled equipment, and
- Work health and safety (WH&S) risk.

3.1 Equipment leakage

Breaking down key stages within the product lifecycle of SF6 filled equipment, for both closed and sealed systems, provides a segmented analysis of the issues and risks involved in purchasing, commissioning, operating, maintaining and retiring the equipment.

Leakage caused by human error is considered to be a risk prevalent throughout each stage of the product lifecycle. As such it hasn't been included in the individual segments but can be considered a risk integral to all stages of the product lifecycle.

Installation and filling

This includes the manufacture, installation and commissioning of new equipment.

In general distribution equipment already contains the full payload of SF6 when dispatched from the manufacturer. As a result the cause of leakage during the installation process is dependent on factors such as;

- External damage (during transport and installation)
- Manufacturing faults
- Incorrect handling procedures

Typically transmission equipment is delivered with a supply of cylinders containing new compressed SF_6 gas. The SF_6 has to be transferred from the cylinders at high pressure into the gas enclosure of the equipment. The nature of these additional procedures presents additional leakage risks. Typical sources of SF_6 leakage during filling are summarised below:

- Filling equipment leakage (hoses, pipework, fittings, valves, regulators, pressure gauges)
- Inadequate gas evacuation of filling equipment upon completion of the filling process
- Incorrect filling procedures or handling
- Incorrect filling pressure

Normal operation

The equipment is installed and in service. It may release a small amount of SF6 due to leakage and it is possible this may contain decomposition products of varying concentrations. The Australian Government has indicated a National Default Emission Standard for SF_6 in service of 0.5% pa. In comparison Ausgrid's annual usage rate for the 2007/8 reporting period was 0.3% pa.

Typical sources of SF6 leakage during normal operation are summarised below.

- Design Fault (Faulty equipment, gas tight seals failing)
- In service leakage (Possibly caused by Installation error, corrosion. Generally the same or below the standard accepted leakage rate of SF_6 from equipment)

Maintenance

The maintenance of equipment may involve removing SF6, possibly containing impurities, such as gaseous decomposition products. Access may be required to enclosures containing solid decomposition products. The inherent risks of SF_6 leakage associated with the maintenance operations are summarised below.

- During gas evacuation and refilling
- Leakage from SF_6 Cylinders
- During Decanting between Cylinders
- During Reprocessing, recycling or rebottling SF_6
- Due to gas sampling and analysis

Abnormal release

In the event of an abnormal incident during which SF6 gas is released (considered to occur infrequently). This could be caused by a variety of factors including equipment failure such as abnormal leakage or internal faults, external fire or vehicle impact. Common causes of abnormal release are categorised as follows.

- Electrical fault
- Design Fault
- Mechanical Damage
- External Fire

End of life

Once the equipment has reached the end of its operational service life it is scrapped, recycled or refurbished. The used SF_6 gas contained within the equipment can be recycled or disposed of.

Typically in transmission equipment the removal of gas is performed by evacuation. This is facilitated by SF_6 gas handling plant utilising a connection already established on the equipment. The gas evacuated from the equipment can either be reclaimed or disposed depending on the quality.

The procedure for distribution equipment differs only in the process for removing the SF_6. In comparison to the closed pressure system, the connection to facilitate the removal of SF_6, is not universal and in some cases is not available, consequently making the process more difficult. The current procedure requires the SF_6 to be extracted by opening the sealed system in a controlled environment. The gas evacuated from the equipment can either be reclaimed or disposed depending on the quality.

Extracting used SF_6 gas also presents the WH&S issue relating to the handling of decomposition products. This will be discussed in Section 3.2.

Overall the risk of SF_6 leakage during this stage in the product lifecycle is determined by the process required to extract the SF_6.

Further detail about typical failure modes, causes and follow-up actions are outlined in Table 3-1.

Table 3-1: *Failure Modes, Causes and Action*

Failure mode	Cause	Source
Work with new SF_6 equipment (filling)	During Manufacture, commissioning and filling of new equipment	GIT, GIS, SF_6 bottles, filling equipment Transmission equipment
SF_6 under normal service conditions (leakage)	The equipment is installed and in service. It releases a small amount of SF_6 due to leakage, which may contain decomposition products.	GIT, GIS, SF_6 bottles (new and used) Transmission and Distribution equipment
Working with used SF_6 which may contain decomposition products	SF_6 possibly containing gaseous decomposition products may have to be removed. Access may be required to enclosures containing solid decomposition products.	GIS, GIT, SF_6 bottles and reclamation/refilling equipment Transmission and Distribution equipment
Abnormal situations: e.g. internal fault, mechanical damage or external fire provoking opening of the enclosure: • during and immediately after the fault: operator safety • after the fault or external fire: restorative work	Abnormal incidents, during which SF_6 gas is released, due to abnormal leakage, internal fault, or external fire	All SF_6 handling equipment
End of life equipment: recycling or disposal	The SF_6 has to be removed and the equipment recycled or disposed of	GIT, GIS, SF_6 bottles Transmission and Distribution equipment

3.2 Impurities and decomposition products

Under certain operational conditions, generally common in all SF_6 electrically insulated equipment, SF_6 is susceptible to decomposition. Primarily decomposition can occur in two ways electrical discharges and heating. Decomposition of SF_6, due to normal and/or abnormal fault conditions, can produce a range of different SF_6 decomposition products generated. Table 3-2 details possible impurities found within SF_6 gas contained in electrical equipment.

The Decomposition products in Table 3-2 may be in the form of gases or in the form of white, tan, or grey powders. Of particular significance is the presence of Hydrofluoric acid (HNF_4) and Sulfuric acid (H_2SO_4) which act destructively on most materials and are especially harmful to skin, eyes, respiratory tract or lungs. For further information see References [2][3].

Table 3-2: *Origin of SF_6 Impurities (Adopted from IEC60480)*

SF6 Situation and Use	Source of impurities	Possible Impurities
During handling and service	Leaks and incomplete evacuation and desorption	Air, Oil, H_2O
Insulating function	Partial Discharge: Corona and sparking	HS, SO_2, SOF_4, SO_2F_2

SF6 Situation and Use	Source of impurities	Possible Impurities
Switching equipment	Switching Arc Erosion	H_2O, HF, SO_2, SOF_2, SOF_4, SO_2F_2, CuF_2, SF_4, WO_3, CF_4, AIF_3
	Mechanical Erosion	Metal Dusts, Particles
Internal Arc	Melting and Decomposition of Materials	Air, H_2O, HF, SO_2, SOF_2, SOF_4, SO_2F_2, SF_4, CF_4, Metal Dusts, AIF_3, FeF_3 WO_3, CuF_2

Consequently the potential presence of decomposition products in SF_6 gas removed from electrical equipment requires further processing before the gas can be reused. The required purity of SF_6 for reuse can be found in References [4][5]. SF_6 can easily be recycled for reuse in electrical power equipment and the purity can be checked in the field using commercially available equipment.

Due to the stability of the SF_6 molecule the disposal of the gas is energy Intensive. High heat is required to break down the molecular structure of SF_6 and typically specialised equipment, such as a plasma arc, is used to dispose of the SF_6. As a consequence preference should be given to recycling the product.

3.3 SF_6 accounting

Ausgrid is committed to providing accurate and consistent SF_6 reporting protocols. The Energy Networks Association (ENA) Industry Guideline for SF_6 Management [6] has defined a three tier system for the accounting of SF_6 emissions. This tier system has been adopted from the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories. Ausgrid intends to develop SF_6 accounting procedures in accordance with the ENA industry guideline. The three tier system has the following definitions.

- Tier 1: National Default Emission Standard accounting
- Tier 2: Mass Balance Accounting System
- Tier 3: Aggregate Loss at Emissions Source accounting.

Transmission equipment accounting

Ausgrid has developed procedures for transmission equipment accounting. These procedures are performed in a manner aligning with the mass balance accounting system (tier 2). In support of Ausgrid's commitment to provide accurate and consistent reporting protocols there is scope to develop this procedure into a tier 3 Aggregate Loss at Emissions Source Accounting.

Distribution equipment accounting

Distribution equipment leakage will only be apparent when the equipment low gas alarm is activated, after inspection, or following an electrical failure. Without the ability to refill the equipment, general practice is to replace/scrap the equipment. This property combined with the number of units on the system suggests that implementing a mass balance accounting system combined with additional equipment tracking considerations will be required, to maintain the accuracy of the accounting system.

3.4 SF_6 emissions reporting

The obligations pertaining to the reporting of SF_6 emissions are outlined in National Greenhouse and Energy Reporting System (NGERS) technical guidelines are as follows:

Calculate stock of SF_6 in GIS and CB applications, by reference to the stated capacity of the equipment according to the manufacturer's nameplate (other estimation methods are also provided, if the above information is not sufficient). Calculate emissions as stock of SF_6 x 0.005.

For more information: http://www.climatechange.gov.au/government/initiatives/national-greenhouse-energy-reporting/progress/~/media/publications/greenhouse-report/nger-determination-2009.ashx

3.5 Storage

Ausgrid maintains a storage supply of SF_6 gas. This gas is used for filling, topping up or refilling equipment within the network. There are two types of SF_6 gas in storage:

- **Used SF_6** i.e. obtained from SF_6 equipment, used SF_6 may contain impurities such as moisture, oxygen or SF_6 decomposition products (see 3.2) in varying quantities.
- **New SF_6** i.e. new gas oversupplied with new equipment and new gas supplied by local SF_6 gas suppliers. The purity of the SF_6 supplied by manufacturers may differ to some extent.

The storage of SF_6 under pressure presents an inherent risk. Failure of the storage vessel could be caused by a number of factors, mechanical failure, explosive failure due heating/fire etc. There is currently a large reserve of SF_6 gas throughout Ausgrid, in the order of 1,500kg.

Typically the SF_6 cylinders supplied with new equipment from international sources such as the United States, Europe and Japan have different fitting types than local Australian suppliers, rendering them unsuitable for reuse by Australian suppliers.

As a result these cylinders have been referred to as ‘single use bottles’ and present a range of issues including:

- Additional waste
- Difficulty in completely removing SF_6 gas from the bottle due to inadequate fittings/issues with vacuum
- WH&S issues in regards to disposal which involves converting the pressure vessel into a object classified as scrap metal. The general procedure is to apply a vacuum for gas removal followed by removing the valve/fittings and drilling a hole in the base of each cylinder.
- Additional storage requirements

3.6 Recycling

The processing of used SF_6 taken from electrical equipment is dependent on the level of impurities within the used gas. Fundamentally there are two options, in order of preference, for handling used SF_6 [5]:

1. Recycling SF6 internally

2. Recycling SF6 externally

Option 1 involves handling the recycling of SF_6 internally within the organisation. SF_6 gas recycling plant capable of recycling used SF_6 to comply with the purity requirements for reuse can be utilised in electrical power equipment as an alternative to new SF_6.

In the event that the used SF6 cannot be recycled by internally, the gas can be treated by a capable external recycling plant rendering it usable in the majority of cases. In particular SF_6 that has an excessive contamination with non-reactive gases can be purified by a specially equipped recycling plant. For further information on each of these options please refer to [4] and [5].

For information on Ausgrid's current recycling process refer to EG120 Waste guidelines.

4 Environment

4.1 Ozone depletion

The depletion of the ozone (O_3) layer in the stratosphere has been recognised by the international community as a cause of adverse effects on the environment and on human health. It can be shown that SF_6 does not contribute to stratospheric ozone destruction. For further information refer to References [1].

4.2 Global temperature increase

The global warming potential of SF_6 is 23 900 times more potent than carbon dioxide (CO_2) with an atmospheric lifetime of approximately 3 000 years. As a result, the Department of Climate Change (DoCC) has determined that SF_6 emissions must be reported under the NGERS System, see Figure 4-1.

Figure 4-1: *Greenhouse gases that must be reported under the Act*

Gas	Chemical formula
Carbon dioxide	CO_2
HFC-125	C_2HF_5
HFC-134	$C_2H_2F_4$ (CHF_2CHF_2)
HFC-134a	$C_2H_2F_4$ (CH_2FCF_3)
HFC-143	$C_2H_3F_3$ (CHF_2CH_2F)
HFC-143a	$C_2H_3F_3$ (CF_3CH_3)
HFC-152a	$C_2H_4F_2$ (CH_3CHF_2)
HFC-227ea	C_3HF_7
HFC-23	CHF_3
HFC-236fa	$C_3H_2F_6$
HFC-245ca	$C_3H_3F_5$
HFC-32	CH_2F_2

Gas	Chemical formula
HFC-41	CH_3F
HFC-43-10mee	$C_5H_2F_{10}$
Methane	CH_4
Nitrous oxide	N_2O
Perfluorobutane	C_4F_{10}
Perfluorocyclobutane	c-C_4F_8
Perfluoroethane (hexafluoroethane)	C_2F_6
Perfluorohexane	C_6F_{14}
Perfluoromethane (tetrafluoromethane)	CF_4
Perfluoropentane	C_5F_{12}
Perfluoropropane	C_3F_8
Sulphur hexafluoride	SF_6

(Source: Table 1.1 The National Greenhouse and Energy Reporting Guideline available at http://whitepaper.climatechange.gov.au/reporting/guidelines/pubs/nger-reporting-guidelines-aug08.pdf)

Despite this, SF6 as used in electrical switchgear does not contribute significantly to the greenhouse effect due to the relatively small overall quantities involved [1].

4.3 Impact on ecosystem

SF_6 is an inert gas. As its solubility in water is very low it presents no danger to surface and ground water or the soil. A biological accumulation in the nutrition cycle does not occur. Therefore SF_6 is harmless to the ecosystem [1].

4.4 Effect of SF_6 decomposition products

The quantities of SF_6 decomposition products in switchgear and control gear gas enclosures are small and they are not released into the atmosphere in significant quantities [1], even in the very unlikely event of an abnormal release. During the end of life disposal of an item of equipment, they can be converted into stable compounds with no adverse environmental impact [3].

4.5 Waste management

Used or contaminated SF_6 that does not meet the requirements for reclamation are classified as hazardous waste. For Further information see the Ausgrid waste classifier which contains details on used and new SF_6. The gas products should be handled in accordance with the Environmental Guideline EG120 Waste guidelines.

4.6 Environmental guidelines

In addition to this document, Ausgrid guidelines that are relevant to the environmental management of SF_6 include:

- Environmental Guideline EG120 Waste guidelines
- Environmental Guideline EG001 Incident Response Procedure
- Network Standard NUS174c Environmental Handbook

5 Health and safety

Predominately the health risks can be categorised into two areas, the effects of pure SF_6 and SF_6 gas containing impurities such as decomposition products.

Pure SF_6 is non-toxic. As such there are no short or long term effects arising from direct exposure. However SF_6 can cause asphyxiation through the displacement of air. This can be managed by existing procedures for confined space entry outlined in:

- WH&S Regulation 2001, Chapter 4, Part 4.3
- Australian Standard AS/NZS 2865 “Safe-Working in a Confined Space”
- Ausgrid Electrical Safety Rules
- ISSC 28 Guideline for Enclosed Spaces in NSW Electricity Networks.

The generally accepted limit for maximum pure SF_6 concentration is 1000 parts per million by volume (ppmv) for a working environment during an exposure period of 8 hours.

Exposure to SF_6 decomposition products can be harmful to the skin, eyes, respiratory tract and lungs. In severe cases pulmonary oedema, a potentially fatal accumulation of fluid in the lungs can result [1][3]. For further information please refer to the Safety Data Sheet (SDS) for Reclaimed SF_6 gas available on the Chemalert database.

5.1 Exposure scenarios

The details of typical exposure scenarios and the associated sources of leakage can be found in Table 4-1. The Threshold Limiting Value (TLV) indicates the maximum concentration in which ventilation is required if the concentration is exceeded this has been included in Table 4-1 please refer to [1] for further information.

Table 5-1: *SF6 Exposure Scenarios*

Scenario	Exposure Type	Source	Threshold Limit Value in parts per million by volume (ppmv)
Work with new SF_6 equipment (**filling**)	New SF_6.	GIT, GIS, SF_6 bottles, filling equipment	1000 ppmv of new SF_6
SF_6 under normal service conditions (**leakage**)	Used SF_6 which may contain decomposition products	GIT, GIS, SF_6 bottles (new and used)	200 ppmv used SF_6 1.6 ppmv Thionyl Fluoride (SOF_2)
Working with used SF_6 which may contain decomposition products	Used SF_6 which may contain decomposition products	GIS, GIT, SF_6 bottles and Reclamation/filling equipment.	200 ppmv used SF_6 1.6 ppmv SOF_2
Abnormal Situations: e.g. internal fault, mechanical damage or external fire causing rupture of the SF_6 enclosure or seals 1) During and immediately after the fault 2) After the fault or external fire: Restorative work	Used SF_6 which may contain decomposition products	GIT, GIS	1) 200 ppmv used SF6 1.6 ppmv SOF2 2) 20 ppmv used SF6 1.6 ppmv SOF2
End of life equipment: recycling, disposal	Used SF_6 which may contain decomposition products	GIT, GIS, SF_6 bottles.	200 ppmv used SF_6 1.6 ppmv SOF_2

5.2 WH&S requirements

Ausgrid developed NEG SM-09 [3] for the purpose of managing the practices employed by Ausgrid staff when handling SF_6 gas, equipment and decomposition products. NEG SM-09 covers the handling of SF_6 gas in procedures such as maintenance operations on equipment containing SF_6. It provides a framework for the safe, responsible handling of SF_6 and SF_6 decomposition products in addition to recommendations on training, protective clothing and specific work functions such as preparing the equipment for gas evacuation.

6 Management strategy

6.1 Data capture & reporting

Ausgrid is required to capture sufficient data to manage the operation of SF_6 based equipment and provide accurate reporting information to DoCC for NGER. Ausgrid's current practice has been developed in order to meet the NGER reporting requirements.

Essentially Ausgrid proposes to develop this current practice, in accordance with the SF_6 accounting methods outlined in the ENA guideline for SF_6 [6]. This will be achieved by two specific objectives, ensuring that the data collected from SF_6 stocktaking and capacity records are consistent across all regions within Ausgrid. This will enable Ausgrid to provide accurate assessment of SF_6 emissions to DoCC for NGER.

- The creation of a database for collating SF_6 equipment data, across the entire network, for both transmission and distribution assets. Essentially for use in tracking SF_6 equipment and generating the required reporting outcomes.
- Development of procedures to ensure consistency of SF_6 equipment handling across the network in support of the above mentioned database system in accordance with the ENA Industry Guideline for SF_6 Management. See Section 6.3.

6.2 Procurement

This management strategy proposes the following strategic outcomes in relation to the procurement of SF_6 gas and equipment. The Procurement strategies have been developed to provide the framework for responsible purchasing of equipment through the following key objectives.

- The evaluation of new SF_6 equipment for use within Ausgrid's network. Primarily this evaluation involves considering alternative types of equipment in addition to the current SF_6 technologies. Additionally integral to this evaluation consideration to be given in regards to the potential impact of carbon trading and importation cost on new SF_6 filled equipment purchases.
- Ensure by means of contract specification, that SF_6 gas from sealed distribution equipment can be removed easily at the end of life of the equipment.
- Minimising the oversupply of SF_6 gas supplied with new equipment. While specifying the volume of gas and container type required with new equipment can reduce the volume of oversupplied gas. By means of negotiating the return of oversupplied SF_6 to the original supplier, Ausgrid can eliminate the accumulation of SF_6 gas.
- As an alternative measure fitting adapters, negotiating agreements with local gas suppliers or specifying containers that can be reused are also possible options.
- To reduce the volume of SF_6 gas currently in storage. Development of a recycling arrangement to manage the accumulation of SF_6 gas within the Ausgrid network.

6.3 SF6 gas handling

The management of SF_6 gas handling requires Ausgrid to implement consistent procedures across the organisation. Ausgrid's current NEG SM09 [3] applies to the following practices:

- Maintenance of Switchgear and Control gear containing SF_6 gas
- The handling of SF_6 gas and decomposition products

This document will be amended with the intention of developing handling and accounting procedures in accordance with the ENA industry guideline for SF_6 management [6] and [1]. Primarily the amendment will cover the handling procedures required throughout the product lifecycle and establish set requirements for both distribution and transmission equipment. In support of various outcomes such as:

- Consistent handling procedures
- Management of WH&S Issues relating to Handling
- Support of SF_6 equipment database
- Providing guidance for training
- Outline SF_6 reporting and accounting procedures

The training of staff in SF_6 handling and reporting shall follow the review and amendment of handling procedures within NEG SM09.

In addition the management of WH&S issues, in relation to the handling of SF_6 shall be reviewed. The key strategies are as follows:

- Identify all job categories involved in handling SF_6 and registering these on the appropriate human resources database. Any staff operating in these positions shall be aware of the following:
  - The handling requirements for SF6 gas. i.e. Awareness, procedures, greenhouse gas emissions and accounting.
  - The location of Chemical register containing SF6 information.
  - The availability of SDSs on New and Used SF6 gas.
- Training requirements.
- Procedures implemented to meet WH&S requirements for the entry of personal following SF_6 equipment failure and release of gas.
- Perform Risk Assessments on the exposure scenarios detailed in Table 4-1. Subsequently a review of the risk assessments and if required implementation of controls to reduce risks to an acceptable level.
- The outcome of the review will be implemented through recommendations which shall be integrated into NEG SM09.

6.4 SF_6 filled equipment management

This includes:

- Minimising the design and planning risks (such as traffic damage) associated with SF_6 filled equipment
- Minimise loss of SF_6 due to equipment operation and/or failure.
- Abnormal Release, incident response and handling procedures, alarms

6.5 SF_6 gas leaks, detection and maintenance

The key outcomes in relation to leakage detection, repair and preventative maintenance are as follows:

- Promptly identify and repair leaks from operational equipment after equipment alarm
- Ensure sufficient SF_6 leakage monitoring equipment is available i.e. Procuring or hiring technologies such as a SF_6 Camera leakage detector.
- Develop program to identify and locate leaks on transmission equipment utilising monitoring equipment mentioned above.
- Investigate feasibility of an alarm to notify of gas losses. It has been noted that some distribution equipment may be capable of presenting a visual flag or alarm signal to identify failure of the SF_6 containment cell.
- Investigation of failures on equipment following annual reporting. Primarily reporting on trend failure modes on particular equipment types.
- Establish Leak Reporting for inclusion into the SF_6 Accounting methodology and processes.
- Planned Maintenance; Alarms, Periodic use of camera, check gas levels, seals etc.

6.6 Management of SF6 gas in storage

The primary objectives of Storage management are as follows:

- Establishing a centralised well managed SF_6 gas storage Facility. The evaluation of SF_6 storage requirements shall be identified in accordance with;
- The WH&S requirements for compressed gas storage.
- Ausgrid's SF_6 handling and accounting procedures outlined in the pending amendment of NEG SM09.
- Minimise risk of stored gas by only keeping the minimum acceptable quantity in storage.

6.7 End of life / disposal of SF_6 filled equipment and gas

Essentially the two categories of equipment (distribution and transmission) will require different disposal processes due to the nature of their design. However the principal outcomes and objectives of the disposal are common between each equipment type. Primarily Ausgrid aims to develop a scrapping procedure that is consistent over the organisation.

Ausgrid has identified the following key objectives in relation to the scrapping process as follows:

- The Identification of SF_6 filled equipment prior to scrapping shall be performed to reduce the risk of SF_6 gas leakage at the end of life/disposal process. This may be performed by the introduction of a trigger/flag into iAMS, activated when SF_6 equipment is selected for disposal. The flag shall be capable of notifying the user that the equipment contains SF_6 and should be dealt with in accordance to the appropriate disposal procedures.

- Manage waste associated with SF_6 filled equipment and gas. The management of new and used SF_6 gas and associated decomposition products in accordance with the EG 120 Waste Guideline, in addition to procedures developed to assess used SF_6 gas for recycling or disposal.
- Minimise the release of used SF_6 to the atmosphere through implementation of handling procedures.
- Preference given to recycling used SF_6 gas, collected from equipment, as opposed to destruction.
- Evaluate the use of an internal recycling facility for SF_6 gas.

6.8 Benchmarking

Benchmarking relies on proactive participation and knowledge sharing between distributors and committees, such as CIGRE (International Council on Large Electric Systems) and the ENA to achieve SF_6 management practices in line with or better than other electricity distributors using SF_6. In addition obtaining information from a central source such as the DoCC will be useful for comparing results against other industries.

Furthermore maintaining accurate documentation and database information on procedures, handling and emissions reporting allows Ausgrid to compare their performance against other distributors by means of these indicators.

7 Environmental management plan

Minimising the environmental risk associated with SF6 is an important environmental priority for Ausgrid. As such, Ausgrid has implemented a range of measures from described within this strategy.

Key measures include:

- Developing procedures for the safe and responsible handling of SF_6 within the network.
- Procuring equipment that meets the highest requirements for leakage rates.
- Prevent further purchasing of SF_6 filled equipment with known leaks and/or premature failures
- Evaluating the use of new SF_6 filled equipment being used within Ausgrid's network
- Developing accounting procedures to track the usage and leakage of SF_6 on the network.
- Capturing sufficient data to meet National Greenhouse and Energy System reporting requirements
- Minimising excess SF_6 gas in storage due to oversupply of SF_6 gas with new equipment
- Ensuring subcontractors are meeting Ausgrid's SF_6 handling and reporting requirements
- Consistency of handling SF_6 across the organisation
- Management of WH&S issues related to handling SF_6 gas and equipment
- Minimising design and planning risks and loss of SF_6 due to equipment operation and/or failure
- Identifying and repairing leaks from operational equipment without delay
- Developing centralised well managed SF_6 storage facilities
- Minimise the release of SF_6 gas from equipment at the end of life/disposal process.
- Manage waste associated with SF_6 filled equipment and gas
- Benchmarking SF_6 management practices in line with or better than other electricity distributors using SF_6 gas and equipment

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
1. Data Capture & Reporting	To capture sufficient data to manage the issue appropriately and meet reporting requirements.	Meet NGER requirements commencing from 1 June 2008.	1.1. Collate SF_6 data of transmission equipment to meet NGER requirements.	Integrated Asset Management System (IAMS) capable of providing SF6 data requirements.	Plant Engineering and Procurement	COMPLETE - Reporting of SF6 quantities in transmission equipment is occuring in IAMS
			1.2. Collate SF_6 data of distribution equipment to meet NGER requirements.	Database created and SF_6 filled distribution equipment additions and removals from Ausgrid's network are identified by type.	Plant Engineering and Procurement	Ongoing
			1.3 Establish SF6 Data fields within IAMS.	Implement relevant SF6 data fields into IAMS.	Maintenance and Replacement Planning	COMPLETE - IAMS data fields set up to record SF6 usage
			1.4 Provide required reporting to DoCC to meet NGER requirements.	Reporting provided to DoCC on time.	Business Policy & Planning	Ongoing
		Meet Tier 2 reporting of ENA industry guideline for SF_6 Management. Strive to meet Tier 3 reporting.	1.5 Collate SF_6 data of transmission equipment to meet Tier 2 reporting in accordance with ENA industry guideline. Additional data about source of leak to be obtained.	Database created as per action 1.1, 1.2 and 1.3.	Plant Engineering and Procurement	Ongoing

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
			1.6 Collate SF_6 data of distribution equipment to meet Tier 2 reporting in accordance with ENA industry guideline. Additional data about source of leak to be obtained.	Database created as per action 1.3.	Plant Engineering and Procurement	Ongoing
			1.7 Investigate improved methods of data capture through IAMS for the purpose of reporting.	Investigations undertaken. Recommendations made.	Maintenance and Replacement Planning	In progress
		Set goal/target for reduction/levels	1.8 Investigate and establish reduction levels for company	Targets set	Demand Management	In progress
2. Procurement	Evaluate the use of new SF_6 filled equipment being used in Ausgrid's network	Procurement evaluation to consider alternative types of equipment as well as SF_6.	2.1 Procurement evaluation to consider alternative types of equipment.	Evaluation to consider alternatives.	Procurement/ Plant Engineering and Procurement/ Transmission and Technical Services	COMPLETE
		Potential carbon trading & importation charge to be factored into new SF_6 filled equipment purchases.	2.2 Notional cost accounting outlined in NEG-SM09 to be used in the interim in procurement processes and evaluation of SF_6 filled equipment.	Notional cost to be implemented in all evaluations.	Procurement/ Plant Engineering and Procurement/ Transmission and Technical Services	Ongoing. Investigate whether the notional cost can be removed now that we have an actual cost based on the C02 equivalent of SF6.

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
	Prevent further purchasing of SF_6 filled equipment with known leaks and/or premature failures.	Data about failure modes from aspect 1 to be used in consideration of procurement of new equipment and amendment of contracts.	2.3. Data about failure modes from aspect 1 to be used in consideration of procurement of new equipment and amendment of contracts.	Process adopted and data considered in equipment evaluation. Contracts amended as applicable.	Procurement/ Plant Engineering and Procurement/Maintenance and Replacement Planning	COMPLETE
	Ensure SF_6 gas can be removed at end of life of distribution equipment.	Ensure future contracts specify option for extraction of gas in distribution equipment at end of life e.g. consistent thread	2.4 Future distribution equipment specifications require gas extraction option for future contracts.	Distribution contracts amended.	Procurement/ Distribution Operations and Reliability	No longer applicable - At the end of life equipment may be contaminated with decomposition products and is therefore managed via ABB. ABB have a process in place for extracting gas for all connection types.
	Minimise excess SF_6 gas in storage due to oversupply of SF_6 gas with new equipment.	Minimise excess SF_6 gas supplied with new equipment	2.5 Negotiate with suppliers about required volumes and containers of SF_6 gas supplied with new equipment to prevent oversupply.	Negotiations undertaken. Recommendations made.	Procurement	COMPLETE
		Reuse SF_6 bottles supplied with new equipment	2.6 Investigate options for reuse of imported bottles. Options include returning to country of origin, fitting adaptors, agreements with local gas suppliers, use of alternative reusable containers or action 2.6.	Investigations complete. Recommendations made.	Procurement	COMPLETE

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
			2.7 Negotiate with suppliers to allow use of locally supplied gas in new equipment.	Negotiations undertaken. Recommendations made.	Procurement	COMPLETE
		Reduce SF_6 gas currently in storage by investigating recycling of used SF_6 gas to comply with supplier warrantee requirements	2.8 Negotiate with suppliers to allow use of recycled SF_6 gas in equipment under warranty.	Negotiations undertaken. Recommendations made.	Procurement	Confirm that suppliers are happy to accept technical grade SF6 in new equipment.
	Ensure sub-contractors are meeting Ausgrid SF6 handling and reporting requirements.	Manage sub-contractors effectively to ensure all SF_6 issues are also being effectively managed by sub-contractors	2.9 Amend contracts to ensure sub-contractors undertaking SF6 filling activities are meeting Ausgrid SF6 requirements and providing required reporting.	Specifications and contracts amended.	Procurement	COMPLETE
3. SF6 gas handling	Consistency of SF_6 handling across the organisation.	All SF_6 handling to be in accordance with SF_6 handling procedures	3.1 Amend NEG-SM09 SF_6 handling procedures to cover both transmission and distribution. Ensure it includes decommissioning of gas bottles prior to recycling.	Procedures revised/developed and communicated to all staff handling SF_6.	Transmission and Technical Services / Engineering Standards and Research	COMPLETE
			3.2 Include reference to handling procedures to prevent accidental release in Environmental Handbook.	Included in Environmental Handbook.	Environmental Services	COMPLETE - July 2008

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
		All relevant positions involved in SF_6 to be trained in SF_6 handling and reporting procedures accordingly	3.3 Develop training for staff in SF_6 handling and reporting.	Training developed.	Plant Engineering and Procurement/ Business Policy & Planning/ Training	DILO has provided training to the regions on delivery of the gas trucks. Confirm with regions as to whether there has been any other training. Discuss with Traning what would be required to meet the recommendations for training made in SF6 handling standards (e.g. IEC/TR 62271-303)
	Manage OH&S issues	All positions involved in handling SF_6 are identified for OH&S purposes	3.4 All positions handling SF_6 are registered on the CHRIS Human Resources database.	Entries into database complete.	Occupational Health & Safety	Confirm with Safety Services
		All job categories identified in the CHRIS database to be handling SF_6 are aware of the handling requirements	3.5 Incorporating awareness through workplace substance training. Chemical Register available for all staff handling SF_6.	MSDS available via Chem Alert database.	Occupational Health & Safety	COMPLETE
			3.5a MSDSs for applicable SF_6 products, available in all on site chemical registers.	Onsite Chemical register periodically maintained.	Occupational Health & Safety	Ongoing

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
		OH&S procedures ensure safe entry following SF_6 equipment failure and release of gas	3.6 Procedures (NEG-SM09) implemented to meet OH&S requirements for safe entry following SF_6 equipment failure and release of gas including decontamination and clean up.	Procedures communicated and implemented	Occupational Health & Safety / Transmission and Technical Services / Distribution Operations and Reliability	Review NEG-SM09 to assess whether these issues are adequately covered. Investigate the option for ABB to provide standby expertise and decontamination services in emergency situations.
			3.7 OH&S issues considered when evaluating SF_6 containment facilities.	Input provided as required.	Occupational Health & Safety	Ongoing
		Risk Assessments performed on SF_6 handling procedures	3.8 Risk assessments performed on the Exposure Scenarios (Table 4-1)	Risks identified and control measures evaluated and implemented.	Occupational Health & Safety	SWMS PT601 - Evacuation or Refilling of SF6 gas has been implemented. This SWMS needs to be reviewed as it does not refer to NEG-SM09 or to TSS02. Also it needs to consider the other exposure scenarios not covered in SWMS PT601 (see Table 4.1).

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
	Capture data required for reporting	Data from transmission filling / top-up and other handling practices obtained and recorded.	3.9 Develop procedures to ensure consistent data capture and obtain data required for SF6 reporting. Examples include bottles are weighed before and after filling, amount of SF6 used in specific equipment recorded, Technical Information System (TIS) or IAMS information recorded etc.	Procedures developed and data obtained.	Transmission and Technical Services	COMPLETE - All regions have scales and procedure TSS02 - SF6 Corrective Top Ups on Equipment Leaking SF6 is being used
4. SF6 filled Equipment Management	Minimise design and planning risks (such as traffic damage) associated with SF_6 filled equipment.	Consideration of alternatives and appropriate siting of new equipment as part of the Environmental Impact Assessment (EIA) process by designers when selecting equipment and sites for new projects.	4.1 Add to Planning Guidance Notes.	Added to Planning Guidance Notes	Environmental Services	COMPLETE - October 2008
	Minimise loss of SF_6 due to equipment operation and/or failure.	Consideration of SF_6 gas containment for transmission equipment.	4.2 Consideration of SF_6 gas containment in transmission equipment.	Investigation undertaken. Recommendations made.	Engineering Standards and Research	Ongoing

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
5. SF6 gas Leaks	Promptly identify and repair leaks from operational equipment.	Regular monitoring of operational equipment to identify leaks promptly.	5.1 Promptly respond to operational transmission equipment after alarm. NOTE: Network availability is a limiting factor.	Response within specified time period.	Transmission and Technical Services	Ongoing
			5.2 Ensure equipment is monitored for leakage sufficiently.	Sufficient monitoring options available.	Transmission and Technical Services	COMPLETE - this is achieved through IAMS recording of top-ups and procedure TSS02 - SF6 Corrective Top Ups on Equipment Leaking SF6
			5.3 Develop program to identify and locate leaks on transmission equipment.	Program developed.	Transmission and Technical Services	COMPLETE - this is achieved through IAMS recording of top-ups and procedure TSS02 - SF6 Corrective Top Ups on Equipment Leaking SF6
			5.4 Investigate feasibility of distribution substation visual alarm to notify of gas loss.	Investigation undertaken.	Maintenance and Replacement Planning	In progress
			5.5 Provide facility for the recording of equipment type failures, through IAMS, for the purpose of generating Annual failure mode Reports	Implement equipment failure recording in IAMS environment.	Maintenance and Replacement Planning	In progress
			5.6 Follow up and investigation of failures on certain equipment type following annual reporting. Using data from action 5.5.	Failure mode reporting completed annually.	Plant Engineering and Procurement / Procurement	Ongoing

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
			5.7 Establish leak reporting process	Leak reporting commenced.	Transmission and Technical Services/ Distribution Operations and Reliability	COMPLETE - this is achieved through IAMS recording of top-ups and procedure TSS02 - SF6 Corrective Top Ups on Equipment Leaking SF6
6. Management of SF_6 gas in storage	Centralised well managed SF_6 gas storage facilities.	Establish centralised SF_6 gas storage facilities.	6.1 Investigate suitable centralised SF_6 gas storage facilities and specify requirements.	Storage facilities identified and requirements specified.	Transmission and Technical Services	COMPLETE - Centralised storage facility has been commissioned at Homebush Depot (June 2013)
		Ensure SF_6 gas storage facilities meet handling requirements including inventories of gas used, adequate signage, weighing bottles before and after use etc	6.2 Identify requirements and establish procedures for SF_6 gas storage areas.	Requirements identified and procedures established.	Transmission and Technical Services / Engineering Standards and Research	COMPLETE - Policy document completed and approved by EM-TS&S on centralised SF6 storage and standardises gas handling , collection and filling regimes. All regions have scales and procedure TSS02 - SF6 Corrective Top Ups on Equipment Leaking SF6 is being used.
	Minimise risk of stored gas by only keeping required quantity in storage.	Determine the quantity of SF_6 required in storage.	6.3 Periodically conduct an assessment to determine the quantity of SF_6 required in storage.	Assessment undertaken.	Transmission and Technical Services	Ongoing

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
		Rationalise SF_6 gas currently in storage.	6.4 Either reuse gas in equipment pending outcome of action 2.7 re supplier negotiations about warrantee, or send excess gas for destruction.	Gas in storage rationalised.	Transmission and Technical Services	In progress
7. End of Life/ Disposal of SF6 filled equipment and gas	Minimise the release of SF_6 gas at end of life of distribution equipment.	Minimise the release of SF_6 gas at end of life of distribution equipment.	7.1 Develop scrapping procedure for SF_6 filled distribution equipment.	Ammend NEG SM09	Environmnetal Services	Review the requirements specified in NEG-SM09 to ensure consistency with EG120. Consider adding to the neutralising procedure an option to package up the waste and send to ABB.
			7.2 Investigate adding trigger/ flag to IAMS such that distribution equipment removed from service is managed in accordance with documented procedures.	IAMS amended or recommendations made.	Maintenance and Replacement Planning	In progress
	Manage waste associated with SF_6 filled equipment and gas.	Manage waste associated with SF_6 equipment and gas.	7.3 Ensure used SF6 gas bottles and equipment are disposed of in accordance with waste database and EG120 Waste Guideline.	Confirm Store Warehouse and Transmission and Technical Services are using waste database.	Environmental Services	COMPLETE
	Minimise release of used SF_6 to the atmosphere.	Manage recycling and disposal of used SF_6	7.4 Add used SF_6 gas to waste database and EG120 Waste Guideline.	Waste guideline and database updated.	Environmental Services	COMPLETE - Procedure has been added to EG120 Waste and the Waste Database

Aspects	Objectives	Performance Target	Management Strategies	Performance Measures	Section Responsible	Progress (In progress, complete, ongoing)
			7.5 Investigate options for recycling used SF_6 gas including evaluation of available internal recycling and testing requirements.	Waste guideline and database updated.	Environmental Services & Transmission and Technical Services	COMPLETE - Procedure has been added to EG120 Waste and the Waste Database
			7.6 Establish waste stream disposal option for used SF_6 gas with waste contractors.	Disposal option identified and functional	Environmental Services	COMPLETE - Procedure has been added to EG120 Waste and the Waste Database
8. Benchmarking	To achieve SF_6 management practices in line with or better than other electricity distributors using SF_6.	Participate and share information with relevant industry and environmental committees, associations and regulators.	8.1 Participate and share information on SF_6 with CIGRE committees.	Available data and processes compared.	Plant Engineering and Procurement	Ongoing
			8.2 Participate and share information on SF_6 with ENA.	Available data and processes compared.	Environmental Services	Ongoing
			8.3 Compare results from NGER reporting and available information from DoCC about other authorities and corporations.	Available data and processes compared.	Business Policy & Planning	In progress

7.1 Completed actions

Refer to the table above.

8 Roles and responsibilities

- Corporate OH&S – provide input into the management of SF_6 handling and WH&S issues.
- Engineering Standards & Communications – involved in developing and implementing this strategy.
- Environmental Services – manage the SF_6 Management strategy, manage the waste aspects of SF_6, prepare greenhouse reporting for Ausgrid including NGERS.
- Maintenance and Replacement Planning – involved in making decisions on and issuing instructions for managing maintenance, reuse, scrapping and disposal of distribution and transmission equipment.
- Plant Engineering – involved with specifying SF_6 filled transmission equipment, developed the current spreadsheet and processes used to capture data on SF_6.
- Substation Engineering – involved in the procurement of new SF_6 filled transmission and distribution equipment including contracts and supplier negotiations.
- Technical and Transmission Services – involved with SF_6 handling primarily for transmission equipment, represent those who do most of the SF_6 handling.

9 References

[1] AS 2791-1996 High-voltage switchgear and control gear – Use and handling of sulphur hexafluoride (SF_6) in high voltage switchgear and control gear (Appendix D).

[2] IEC 60376 – 2005 Specification of technical grade sulphur hexafluoride (SF_6) for use in electrical equipment. Ref no CEI/IEC 606376:2005

[3] NEG-SM09 – 2007 Network Engineering Guideline Substations Zone and Sub transmission, Sulfur Hexafluoride (SF_6).

[4] IEC 60480 – 2004 pt 10. Guidelines for the checking and treatment of sulphur hexafluoride (SF_6) taken from electrical equipment and specification for its re-use. Ref no. CEI/IEC 60480:2004

[5] CIGRE – 2003 SF_6 Recycling Guide Task Force B3.02.01. Reuse of SF_6 gas in electrical equipment and final disposal.

[6] Energy Networks Association (ENA) DOC 022-2008 Industry Guideline for SF_6 Management

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
	Examine Overhead Lines in accordance with NRS-166, with attention to the following:	
	Access / Easement / Right of Way / Roadway	
1	Examine for building works or landscaping affecting / potentially affecting safety clearances and access to assets.	
2	Examine access track and associated infrastructure for excessive damage /degradation/erosion.	
3	Examine vegetation does not encroach within overhead line safety clearances.	
4	Examine warning signs for enchroachment of vegetation, vandalism and display of correct information.	
5	Examine warning signs for legibility, correct alignment and structural integrity.	
6	Examine warning signs to ensure they are fitted in the required locations.	
7	Examine livestock barrier (where fitted) for integrity.	
	Wood Pole Arrangement	
8	Examine earthwire batten for security and degradation of timber.	
9	Examine earth downwire and connections for mechanical damage.	
10	Examine earth downwire stand-off brackets for attachment to pole.	
11	Examine earthwire to ensure it is securely attached to the pole.	
12	Examine pole foundation for signs of degradation, subsidance or altered ground level.	
13	Examine pole for external signs of termite activity and rot (mud trails, sound pole etc).	
14	Examine pole head for significant splits.	
15	Examine pole head for evidence of rot.	

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
16	Examine pole for unauthorised attachments or loose fittings which allow climbing by unauthorised persons.	
17	Examine pole for loose sapwood and fittings.	
18	Examine pole for misalignment and impact damage.	
19	Examine pole for fire / lightning damage.	
20	Examine pole for presence and correctly fitted pole cap.	
21	Examine overhead line pole and feeder identification plaques for legibility / vandalism.	
	Metal Pole / Standard Arrangement	
22	Examine pole foundation for signs of degradation, subsidance or altered ground level.	
23	Examine pole for unauthorised attachments or loose fittings which allow climbing by unauthorised persons.	
24	Examine pole for misalignment and impact damage.	
25	Examine pole for fire damage.	
26	Examine overhead line pole and feeder identification plaques for legibility / vandalism.	
27	Examine pole bolts and fasteners for corrosion.	
28	Examine pole structure for corrosion.	
29	Examine pole for missing / damaged access cover.	
	Concrete Pole / Standard Arrangement	
30	Examine concrete pole for excessive surface rust stains.	
31	Examine concrete pole surface damage or spalling.	
32	Examine pole for missing / damaged access cover.	

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
33	Examine pole for misalignment and impact damage.	
34	Examine pole foundation for signs of degradation, subsidance or altered ground level.	
35	Examine pole for unauthorised attachments or loose fittings which allow climbing by unauthorised persons.	
36	Examine overhead line pole and feeder identification plaques for legibility / vandalism.	
	Pole Top Arrangement	
37	Examine crossarm for external signs of termite activity.	
38	Examine crossarm for signs of rot.	
39	Examine conductor ties for damage or looseness.	
40	Examine amourgrip suspension units (where used) for evidence of degradation.	
41	Examine galvanised steel termination fittings for signs of excessive corrosion.	
42	Examine crossarm arrangement for corroded or broken fittings.	
43	Examine crossarm brace for excessive corrosion.	
44	Examine crossarm for distortion.	
45	Examine crossarm for cracks / splits/ weathering degradation.	
46	Examine earthwire standoff brackets for distortion / excessive corrosion.	
47	Examine Yellow Warning Marker for visibility and security where fitted (warning of overcrossing for aircraft feeder patrol).	
48	Examine insulators for signs of excessive surface degradation (contamination), corrosion of cap/tongue cracks or breaks.	
49	Examine pin type insulator for pin corrosion.	

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
50	Examine Insulator support fittings for signs of excessive corrosion.	
51	Examine pole top arrangements for loose fittings.	
52	Examine two piece pole band arrangement for corrosion.	
	Conductors	
53	Examine conductor termination arrangement for degradation.	
54	Examine conductor span for adequate safety clearances.	
55	Examine phase and earth conductors for burns/stranding.	
56	Examine conductor/insulator ties for integrity.	
57	Examine earth and phase conductors for excessive sag.	
58	Examine conductors for foreign objects.	
59	Examine covered/insulated conductors for insulation integrity.	
60	Examine overhead line for missing(stolen) earth wire.	
61	Examine galvanised steel conductors for signs of excess corrosion.	
	Conductor Connections	
62	Examine conductor connections/clamps for signs of looseness, excessive corrosion, overheating or burning.	
63	Examine Insulation Piercing Connectors (IPCs) for signs of deterioration.	
	Conductor Accessories (where fitted)	
64	Examine marine / aircraft navigation hazard makers for visibility and correct location.	
65	Examine vibration damper for correct position and condition.	
	Guy Arrangement	

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
66	Examine ground anchor and guy wire for mechanical damage.	
67	Examine ground anchor for corrosion.	
68	Examine ground anchor foundation for signs of degradation or movement.	
69	Examine galvanised steel wire and components for stranding and signs of corrosion.	
70	Examine guy wire insulator for degradation or lighting damage.	
71	Examine guy wire sight board is visible and present.	
	Pillars	
72	Examine pit for obstructions to access.	
73	Examine pillar foundation for signs of degradation, subsidance or altered ground level.	
74	Examine pillar for misalignment and impact damage.	
75	Examine pillar for graffiti vandalism. Report incident to Graffiti Hotline (13 15 35).	
76	Examine pillar for presence and correctly fitted cover.	
77	Examine pillar identification plaques and warning stickers for legibility / vandalism.	
78	Examine pillar bolts and fasteners for corrosion.	
	Pits and Pit lids	
79	Examine pit for obstructions to access.	
80	Examine pit surrounds for signs of degradation, subsidance or altered ground level.	
81	Examine pit lid for misalignment and impact damage.	
82	Examine pit lid for corrosion.	

Appendix A

Overhead lines

Maintenance Standard OH0112

Location:	Overhead Lines
Type :	**Patrol - Subtransmisison Concrete, wood and steel pole lines including LV pillars and pit lids.**
Revision Date :	**17-Jun-2011**
Reference:	**NRS-166**

#	ACTION	In Accordance With
	Business Tasks	
83	Examine access tracks to support structures particularly in National Parks.	

Appendix B

Switchgear

Maintenance Standard SW0608

Location: Substations

Type : **Circuit Breaker, 33kV & 11kV , Indoor Bulk Oil, Generic**

Revision Date : **7-Jun-2010**

Reference:

#	ACTION	In Accordance With
1	Check circuit breaker operation using in-service trip check. Record trip and close timing. Opening time to be less than Table 1 below. For circuit breakers with reclosing, check that the circuit breaker recloses automatically. For normally open circuit breakers, perform a functional closing check.	See Attachment
2	**For Outdoor equipment** Examine outdoor enclosure and door seals for signs of leakage and corrosion. Pay particular attention for ingress of leaves and vermin.	
3	Examine outdoor enclosure bushing gaskets for signs of leaks.	

Table 1 Opening Time Limits

80ms	Reyrolle LMT, Email S15, AEI JB721/JB821
90ms	Brush VTD
115ms	Westinghouse F250
120ms	Reyrolle LA22 / LC22, Westinghouse F100 / F150
100 ms	All other indoor bulk oil Circuit breaker types

Appendix C

Underground Cables

Maintenance Standard UG2101

Location: Pillar

Type : **Low Voltage all types**

Revision Date : **31-Aug-2012**

Reference:

#	ACTION	In Accordance With
1	***Each Pillar in turn*** Test temperature of pillar connections using thermovision camera. - For Non metal pillars with cover on during winter months after sundown and before sunrise. - For Metal pillars with cover off	