System Maintenance Operating Expenditure Plan for the 2014-19 period

Executive Summary

This document provides an overview of Ausgrid's proposed system maintenance operating expenditure to support its transmission and distribution network during the 2014-19 regulatory period. In total, Ausgrid proposes total operating expenditure of $1.265 billion (real FY2013-14 dollars) over the period, comprising the following operational activities:

- Routine Maintenance.
- Non-Routine Maintenance.
- Emergency Response.

The total operating expenditure is provided in the table below:

$K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Base Year Maintenance	236,576	243,029	248,135	253,363	259,089	1,240,192
Growth Factor Private Mains	5,637	2,836	2,884	2,935	2,986	17,278
Growth Factor Asbestos	1,489	1,507	1,534	1,562	1,591	7,682
Total	243,702	247,372	252,553	257,860	263,666	1,265,152

Table 1 – Total system maintenance operating expenditure 2014-19 regulatory period

The focus of our maintenance strategy for the 2014-19 regulatory period is to ensure that our assets continue to provide their necessary functions, by preserving them in a safe and reliable condition in order to address our responsibilities as an asset owner and service provider. These needs must be addressed with strategies that achieve the following asset management objectives:

- Comply with all required obligations to provide a safe and secure network.
- Create a network that is sustainable and stable over the long term.
- Maintain the existing levels of reliability, safety, security and quality of supply.
- Ensure that all actions taken are cost efficient over the life cycle of our assets.

These objectives are consistent with and give effect to the operational expenditure objectives contained in clause 6.5.6(a) of the National Electricity Rules (NER).

Appropriate maintenance expenditure helps to ensure that our assets are fully utilised and any assets that are in poor condition, pose significant risks and may not meet statutory obligations, do not remain on the network undetected until such time as an incident occurs. This ensures Ausgrid can provide a safe and reliable supply of electricity to its customers and all obligations or requirements associated with the provision of standard control services can be met.

There is a direct link between Ausgrid's maintenance and replacement strategies. Our maintenance programs are closely aligned with our replacement programs to ensure the most cost effective treatment of our assets is undertaken.

Ausgrid's maintenance strategy aims to maximise the lifecycle of its assets through the delivery of maintenance tasks where they are economically prudent and cost effective. Where causes of failure can no longer effectively or safely be maintained, in a cost-efficient manner, options such as replacement, refurbishment or modification are investigated. The feasibility, costs and risks of these potential options are assessed in order to make an appropriate investment decision. When examining the costs of maintenance and replacement strategies, care is given to ensure that all costs encountered in the asset life cycle are accounted for. This life cycle view ensures that costs to consumers are minimised over the long term.

For each maintenance cost category, Ausgrid assesses the underlying drivers, activities, plans and strategies for the next regulatory period and adopts a method that is appropriate to produce a forecast operating expenditure that reasonably reflects the operating expenditure criteria specified in the NER. Ausgrid's total forecast operating expenditure is the sum of the forecasts of these categories. Ausgrid has generally used the base year method or a variation of the base year method. These variations include:

- Base year method – variation by volume.
- Base year method – historical averaging.
- Bottom-up method for change factors

The proposed operating expenditure for the 2014-19 regulatory period is seven per cent different to the actual and expected operating expenditure during the 2009-14 regulatory period. This reflects the ongoing business as usual operations with the following change factors:

- Implementation of private mains asset maintenance strategies required for Ausgrid to fulfil its statutory and legal obligations.
- Progressive renewal of vegetation management contracts resulting in an increase to required expenditure over the five year period.
- Introduction of a comprehensive asbestos and asbestos containing materials audit and inspection regime over the five year period.

Ausgrid has performed very well in the 2009-14 regulatory period, against the determination. Completion of routine maintenance has been exceptional, and non-routine costs have been contained. Despite an increase to the Ausgrid asset base, a reducing trend in expenditure in 'real' terms has been observed during the 2009-14 regulatory period.

Ausgrid has based the proposed 2014-19 system maintenance program on the performance during the current 2009-14 regulatory period, appropriate methods used to forecast each cost category within the six main asset groups and consideration of external factors such as the relationship between operational and capital expenditure. This has allowed Ausgrid to produce the most economically prudent and cost effective system maintenance program for the 2014-19 regulatory period to ensure our objectives as a network service provider can be met.

Introduction

The purpose of this document is to provide an overview of Ausgrid's forecast operating expenditure required to meet its obligations in delivering its maintenance program for the 2014-19 period. It provides background on the characteristics of our functional operations, and the reasons why we are required to undertake them to achieve the overall strategic objectives of Ausgrid.

Ausgrid is required to provide a safe, reliable and cost effective electricity transmission and distribution network for its customers, that meets the regulatory and licence compliance standards of performance and safety. The Electricity Safety Act, Electricity Supply Act 1995, the associated NSW Electricity Supply Regulations and Industry Codes of Practice establish the accountabilities of organisations responsible for construction and maintenance of electrical infrastructure and assets.

Responsibilities include the requirement for a set of processes and controls over engineering, accounting and maintenance functions, which will ensure the safe and reliable operation of assets under the owner's control. The management actions necessary to maintain assets in a safe and reliable condition are governed by commercial considerations and by statutory responsibilities of Ausgrid under the Electricity Safety Act and other legislation of the New South Wales and Federal Parliaments. This set of responsibilities is fundamental to the business of Ausgrid as an asset owner and service provider.

Sound and effective asset management policies and systems represent a critical success factor for Ausgrid, and describe the set of actions taken through the asset life cycle to achieve stated business objectives. Current and future opportunities demand that Ausgrid establishes and maintains a progressive asset management program. This ensures Ausgrid achieves compliance with statutory and legislative obligations for safety and environmental management, maintains asset standards and condition in line with customer needs and expectations, and delivers cost efficient operation and maintenance of the assets.

The designated role of Ausgrid as an asset management service provider leads directly to the requirement to establish asset management policies and systems in order to meet its statutory, legislative and regulatory obligations. The sound and efficient asset management processes and methods used by Ausgrid provide a further benefit to be able to transparently prove to regulators the prudency and efficiency of system maintenance operating expenditure.

Objectives

Ausgrid's asset management objectives are to:

- Comply with all required obligations to provide a safe and secure network.
- Create a network that is sustainable and stable over the long term.
- Maintain the existing levels of reliability, safety, security and quality of supply.
- Ensure that all actions taken are cost efficient over the life cycle of our assets.

The focus of our strategy for the 2014-19 regulatory period is to ensure that our assets continue to provide their necessary functions by preserving them in a safe and reliable condition in order to address our responsibilities as an asset owner and service provider.

These objectives are consistent with and give effect to the operational expenditure objectives contained in clause 6.5.6(a) of the National Electricity Rules (NER).

Scope of activities

Ausgrid's network is made up of a diverse range of assets, from transmission to distribution. In order to manage this sizable asset base, we have categorised our assets into six groups. These groups are used to forecast both our replacement and maintenance expenditure. The groups are as follows:

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 Tansgrid 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 Tansgrid 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.

Maintenance to be performed on any asset can be broadly divided into three categories:

- Routine Maintenance.
- Non-Routine Maintenance.
- Emergency Response.

Routine maintenance comprises the set of actions needed to either:

- Detect an unsatisfactory condition through some form of programmed inspection or condition monitoring action.
- Prevent or delay the occurrence of a specific failure mode.

Non-routine maintenance tasks are those necessary to correct failures or deterioration detected during programmed inspection, or those necessary to perform engineering investigations and other non-predetermined activities.

Emergency response tasks are those necessary to correct failures which result from unscheduled equipment failure during use of the asset, failures that may arise through extreme weather events such as storms, bushfires and floods and failures that arise from other physical interference by non-related entities such as animal activity.

Despite the existence of an effective scheduled routine maintenance program, some unscheduled failures will always occur.

Ausgrid's total system maintenance operating expenditure during the 2009-14 regulatory period is made up of the following cost categories for each of the six asset groups shown in the system maintenance matrix in *Figure 1* reflecting the activities undertaken to maintain our network:

	Maintenance Type						
	Inspection PM01	Corrective PM02	Breakdown PM03	Nature Induced Breakdown PM04	Damage by Third Party PM05	Non-Direct Maintenance PM08	Engineering Support PM09
Asset Group	Transmission Substations						
	Zone Substations						
	Distribution TXs & Substations						
	Overhead Transmission Lines						
	Underground Transmission Cables						
	Distribution Overhead & Underground						

Figure 1 — System maintenance matrix

a) Inspection: Work associated with undertaking planned appraisal and preventative maintenance tasks. This category includes condition monitoring and all routine inspection tasks. Inspection tasks are designed to identify corrective issues and are carried out in a repetitive manner with a generally levelled workload.

b) Corrective: All work associated with correcting defects that have not yet resulted in a 'breakdown'. Corrective maintenance is undertaken when assets fail to meet the threshold criteria set to ensure it remains in working order until the next inspection maintenance cycle. These tasks are generally driven from the results of the inspection process.

c) Breakdown: All work associated with equipment that has ceased to perform its intended function (excluding nature induced breakdown).

d) Nature Induced Breakdown: All work associated with equipment that has ceased to perform its intended function due to factors beyond the equipment's design capability (for example, animals causing equipment malfunction). These failures cannot be managed through normal maintenance activities and may be carried out under emergency conditions.

e) Damage by Third Party: All work associated with equipment that has ceased to perform its intended function due to factors beyond the equipment's design capability (for example, a car hitting a pole causing equipment malfunction). These failures cannot be managed through normal maintenance activities and may be carried out under emergency conditions.

f) Non-Direct Maintenance: All work associated with the testing of plant, tools and equipment that is used to deliver the different maintenance activities defined above. Also includes any training and development required to deliver maintenance activities.

g) Engineering Support: Work associated with preparing asset engineering standards, maintenance analysis, engineering investigations and maintenance planning, scheduling and coordination.

The PM05, Damage by Third Party cost category was a Standard Control Service during the 2009-14 regulatory period and the performance of the category has been discussed in Section 2, however, this category will not be catered for in the system maintenance forecast during the 2014-19 regulatory period as it has now been classified by the AER as an 'Unregulated Service' from 1 July 2014. Refer to the AER's Stage 1 Framework and Approach Paper, pages 19, 42 (table 6) and 77.

Vegetation Management

Ausgrid already undertakes vegetation management as part of its routine system maintenance program. The vegetation management maintenance activity is a sub-category of the inspection cost category, as the function is primarily driven by inspection.

Ausgrid is required to provide a safe and reliable electricity supply network at all times. The overhead electrical network is vulnerable to interruption and damage from vegetation growing into, or near assets, particularly overhead conductors. Failure to manage vegetation and maintain specified vegetation clearances from the overhead electrical network may adversely impact the safety of Ausgrid's employees and members of the public, as well as negatively influence the reliability of supply for Ausgrid customers and increase the risk of a bushfire being ignited by vegetation coming into contact or arcing with the overhead network.

The legislative requirements for tree trimming around the electricity network are driven from Section 48 of the Electricity Supply Act 1995, and the vegetation profile that is applied to the overhead network is defined in ISSC3 – 'Guideline for managing vegetation near powerlines'. ISSC3 sets clearance profiles and guidelines for the management of vegetation, in addition Ausgrid sets strategy for how to deliver an acceptable risk outcome for acceptable expenditure. In doing this, Ausgrid uses the expertise of the arboriculture market in contracting out these works. These works consist of routine trimming of trees, easement clearing, access track maintenance and tree removal programs.

Ausgrid has been carrying out vegetation management (tree trimming) on a formal contractual basis since 1991/92. Between 1992 and 2013 the scope of the contracts has varied widely in the geographical area covered, the outsourcing structure and in the vegetation clearance requirements. In 2013 the entire vegetation management program was sourced using external contract companies.

Further information on the strategy for vegetation management can be found in Section 3.

Private Mains

Ausgrid has not previously undertaken a regular inspection of private mains assets.

Ausgrid applies the NSW Service and Installation Rules to determine the delineation of private electrical installations from network assets. Ausgrid's requirements for the inspection and maintenance of private aerial mains are detailed in our publication ES1 Customer Connection Information and the Network Standards referenced in ES1. The required actions and responsibilities of Ausgrid and network customers under the Electricity Supply (Safety and Network Management) Regulation 2008 and the Industry & Investment NSW Code of Practice (Electricity) – Service & Installation Rules of NSW, October 2006, as amended August 2012 are reflected in Ausgrid's Network Management Plan.

Ausgrid's network management plan builds a framework for ensuring Ausgrid's network provides an adequate, reliable and safe supply of electricity by maintaining compliant infrastructure. Achieving this objective involves management of safety, environmental and infrastructure security risk in relation to Ausgrid's network. The various environmental, safety and asset security obligations applicable to Ausgrid's network, and to the services Ausgrid provides as an electricity distributor, have been taken into account in developing Ausgrid's network management strategies. These include obligations under regulatory instruments including the Electricity Supply (Safety and Network Management) Regulation 2008.

Whilst Ausgrid have robust polices and procedures in place for our own assets, our current inspection policies do not cater for the inspection of privately owned overhead mains or support structures. Our polices are confined to Ausgrid's assets and extend to the point of demarcation between our network and that of the customer, typically at the point of attachment, 'A' pole or other connection point. This is stated clearly in our Network Management Plan, and is also reported annually as part of the Network Performance Review.

Although the demarcation point is clearly stated within the NSW Service and Installation Rules, the majority of customers are not aware of this or their responsibilities.

Ausgrid has reviewed its obligations under the Electricity Supply (Network Safety and Management) Regulation 2008 regarding the inspection, testing and maintenance of private mains and the extent of these obligations. Whilst the regulation does not directly oblige Ausgrid to provide an inspection service, legal advice is that the regulation does impose a clear obligation on Ausgrid to ensure that such inspection, testing and maintenance occur. Ausgrid has determined that it needs to improve its processes to ensure the inspection, testing and maintenance of private mains connected to our network is carried out on a regular basis. Currently, Ausgrid is at risk of breaching the regulatory and statutory obligations imposed under the Electricity Supply (Safety and Network Management) Regulation 2008, specifically clauses 10(2c) and 12(2e).

Ausgrid also has an obligation to manage bushfire risks as they relate to its network. We do this by adopting a risk management approach that aims to ensure our assets and our customers' private powerlines are safe and are properly designed, constructed and maintained, by the responsible party. Based on the legal opinion of current practice, it is apparent that Ausgrid carries unacceptable risk of prosecution without taking further action. The obligations that owners of electrical infrastructure have in bushfire prone areas are detailed in our Bushfire Risk Management plan.

The Bushfire Risk Management Plan has been prepared in accordance with the Electricity Supply (Safety and Network Management) Regulation 2008, which requires Ausgrid to develop, publish, implement and report against our bushfire risk management strategy. As required by the Director-General, we have incorporated the provisions of ISSC 31 Guideline for the Management of Private Lines and ISSC 33 Guideline for Network Configuration during High Bushfire Risk Days into this Plan. This plan outlines the procedures, standards, codes and guidelines that Ausgrid applies to construction, operation and management of its network. The network management plan also provides an overview of Ausgrid's bushfire risk management strategies in relation to key stakeholders including:

- Landowners and occupiers.
- Local government.
- Government agencies.
- Emergency services.

Ausgrid's process for the management of bushfire risk safety defects in customers' installations is detailed in its internal company procedure CS WI 30/03 Processing Bushfire Related Defects Following a Line Patrol Report.

Bushfire risk management for electrical equipment is a shared responsibility between Ausgrid and all landowners/occupiers who are network customers in Ausgrid's distribution area. Ausgrid undertake inspection, testing and maintenance of our assets. While it is the responsibility of landowners/occupiers to ensure their electrical installations are free from defects that could cause fire or other hazards, it is also Ausgrid's responsibility to ensure this responsibility is upheld.

Ausgrid staff are sometimes required to climb private poles to complete necessary work. As noted previously, despite clear demarcation, private owners of electrical infrastructure are not aware of their obligation to maintain, therefore it is likely that maintenance on those assets has not been undertaken for some time, if at all. This poses a significant safety risk to Ausgrid employees who are required to work either directly on, or in close proximity to privately owned assets. There is also a significant safety risk to the customer and owner of the private assets, particularly in bushfire prone areas as the condition of these assets is largely unknown.

Customers are responsible for keeping private overhead powerlines free of vegetation, and must ensure that only appropriate trees are planted in areas that are close to powerlines. Customers are also responsible for the inspection, testing and maintenance of their powerlines and poles at regular intervals, the same way we do.

Despite reasonable efforts made by Ausgrid to increase customers awareness of their responsibilities in regard to private mains, there is currently no enforcement mechanism available to Ausgrid to ensure that the inspection, testing and maintenance of these assets does occur.

As a result, Ausgrid considered it prudent that an inspection process is undertaken and where a defect is identified, the inspection results provided to the owner for rectification. It is planned to use the existing defect notification process to execute this process, with ultimate disconnection of installations with defects that present major risks that remain unrectified.

To enable an enforcement policy to be applied to assist our customers to meet these requirements we aim to:

- Continue to clearly communicate to customers their obligations in our publications ES1 Customer Connection Information.
- Continually remind customers of their responsibilities via a targeted media campaign at the approach to every bushfire season.
- Continue to provide customers with detailed safety information (via brochures, account inserts and website).
- Advise customers of any defects observed on their private powerlines and poles (by members of the public or our staff) by issuing notices and following up actions where appropriate.

Due to the fact that Ausgrid is at risk of breaching the regulatory and statutory obligations imposed under the Electricity Supply (Safety and Network Management) Regulation 2008, Ausgrid has proposed that a routine program of regular inspection of these privately owned assets is implemented to ensure that the owners of these assets are aware of the condition and requirements for their continued safe and reliable operation.

While it is Ausgrid’s responsibility to maintain the electricity distribution network, including the poles and wires which are identified as our assets required for the connection of customer installations, all new and existing electrical work within a customer’s electrical installation remains the responsibility of the customer and their electrical contractor.

Ausgrid aims to protect people in customers’ premises by:

- Supporting the scheme of licensing electrical contractors.
- Enforcing compliance with the relevant requirements, codes and regulations.

A policy for the management of private mains assets has now been developed to provide a standard set of principals to be applied across Ausgrid to the delineation of ownership of private mains and the allocations of responsibility between customers and Ausgrid for private mains inspection, testing and maintenance. The requirements of this policy are consistent with the proposed expenditure forecast for the 2014-19 regulatory period.

Asbestos Containing Materials (ACM)

The use of asbestos was commonplace as a building material until the late 1980s. In the electricity industry, it had a variety of uses, such as insulation for electrical wiring, known as cable bandages, in fire doors as well as in underground pit covers, electrical backing boards, cement sheeting and tiles.

Ausgrid manages the risks posed by asbestos exposure in its workplace via an Asbestos Safety Management Plan and its documented safe work processes. This plan has historically included the ad-hoc survey and inspection of asbestos-containing materials completed by Ausgrid staff. The ad-hoc inspection and survey work was mainly limited to larger substations and has been completed historically by contracted expert service providers on a reactive basis.

Current legislative requirements require that all inspections of asbestos-containing materials are conducted on a routine five yearly basis by competent persons. Ausgrid has therefore formulated an asbestos-containing materials asset audit strategy to undertake the comprehensive inspection of all assets by competent persons in accordance with these legislative requirements. Data obtained through the inspection of all assets will be recorded in a comprehensive asbestos register to detail the status of known asbestos in all forms throughout Ausgrid's electricity network and assets.

The legislated requirements for the routine inspection of asbestos-containing materials by a competent person are in accordance with:

- NSW Work Health Safety Act 2011
- NSW Work Health Safety Regulation 2011
- NSW Code of Practice – Managing Asbestos in the Workplace

Specifically this legislation states:

Regulation 425

"A person with management or control of a workplace must ensure an asbestos register is prepared and kept at the workplace. The asbestos register must be maintained, to ensure the information in the register is up-to-date"

Regulation 426

"A person with management or control of a workplace must ensure an asbestos register is reviewed and where necessary revised by a competent person if:

- *The asbestos management plan is reviewed*
- *Further asbestos or ACM is identified at the workplace, or*
- *Asbestos is removed from or disturbed, sealed or enclosed at the workplace."*

Code of Practice - Section 3.2

"The register should be reviewed at least once every five years to ensure it is kept up-to-date. When reviewing the asbestos register, the person should carry out a visual inspection of the asbestos and ACM listed to determine its condition and review the asbestos register as appropriate. Previous asbestos registers and records relating to asbestos removal jobs, for instance clearance certificates, can assist in identifying all asbestos and ACM in the workplace".

Requirement for activities

Establishing the set of programmed maintenance requirements is a key element of the management process for all assets. This not only establishes what actions must be put in place to maintain the asset in satisfactory condition during its serviceable life, but it also provides the basis for determining financial and technical support requirements for the asset. These requirements take the form of training, spares, support equipment as well as data collection and analysis requirements for managing and monitoring the cost effectiveness of the maintenance program. Maintenance strategies incur the cost of inspection tasks, but save on expenditure associated with in service failures that are expensive and realise one or more of the following risks:

- Safety.
- Environmental.
- Damages/liability.
- Adverse publicity.
- Reliability.

In determining Ausgrid's maintenance requirements and strategies, a view must be taken in regards to the risks posed by the assets. This is because many of Ausgrid's obligations do not prescribe definite actions or objective standards. This means that Ausgrid must compare the risks faced, with the cost required to mitigate, or remove the risk. As the risks posed by our assets are many and varied, we have developed a consistent framework with which to view risk, in order to be able to make comparisons between different assets and different types of risks.

Ausgrid uses the Failure Modes and Effects Criticality Analysis (FMECA) and Reliability Centred Maintenance (RCM) processes for determining maintenance requirements. This internationally recognised process provides a structured method for:

- Assessing the likely causes of asset failure.
- Assessing the consequences of that failure.
- Determining tasks that can be undertaken in order to prevent a failure occurring or detect a deterioration in condition.

This is a dynamic process that is used to refine the planned maintenance tasks in response to the performance and/or condition degradation during the life of an asset.

The trade-off between the costs required to undertake certain planned maintenance tasks, and the potential cost of failure are examined in order to determine an optimised package of task and timing requirements.

Once requirements are determined, a levelling process is undertaken in order to smooth programmed workflow into a somewhat predictable path. This is done at a level appropriate for the maintenance task. For example, most tasks are delivered on a regional basis, therefore levelling is performed at a regional level for those tasks.

Appropriate maintenance expenditure helps to ensure that our assets are fully utilised and any assets that are in poor condition, pose significant risks and may not meet statutory obligations, do not remain on the network undetected until such time as an incident occurs. This ensures Ausgrid can provide a safe and reliable supply of electricity to its customers and all obligations or requirements associated with the provision of standard control services can be met.

There is a direct link between Ausgrid's maintenance and replacement strategies. Our maintenance programs are closely aligned with our replacement programs to ensure the most cost effective treatment of our assets is undertaken.

Ausgrid's maintenance strategy aims to maximise the lifecycle of its assets through the delivery of maintenance tasks where they are economically prudent and cost effective. Where causes of failure can no longer effectively or safely be maintained, in a cost-efficient manner, options such as replacement, refurbishment or modification are investigated. The feasibility, costs and risks of these potential options are assessed in order to make an appropriate investment decision. When examining the costs of maintenance and replacement strategies, care is given to ensure that all costs encountered in the asset life cycle are accounted for. This life cycle view ensures that costs to consumers are minimised over the long term.

Outcomes last period

During the 2009-14 period, Ausgrid expect to spend $1.137 billion dollars (nominal dollars) on system maintenance operating expenditure to deliver our objectives.

The purpose of this section is to identify the outcomes of operating expenditure in the 2009-14 period and the reasons for variation to forecasts. Examination of previous expenditure can provide critical insights into the level of forecast operational expenditure, and the veracity of previous forecasting methods.

1.1 Circumstances during 2009-14 period

Ausgrid's network was formed by the mergers of a number of different, smaller organisations, such as regional county councils and the asset acquisition from the former NSW Electricity Commission. This has resulted in a network with an asset base of varying type, age, configuration and quality. Even assets that appear to be of the same manufacturer and model can vary in technical characteristics due to historically disparate specifications, maintenance requirements and operating environments. Due to the general long-life nature of electrical assets, many of the original assets and configurations are still in service today. This diversity requires that care be taken when planning the network to help drive a future commonality in the asset base that is grounded in safe and efficient operation.

A large proportion of Ausgrid's asset base was built in the 1960s and 1970s. This coincided with large increases in the demand for electricity. Assets were generally built with capacity for future growth, demonstrating the long term planning nature of the organisation at the time. For various reasons, the 1980s and 1990s heralded a long period of under-investment in the network. Routine maintenance completion was poor, and preventative maintenance techniques were not advanced. Similarly, the levels of replacement and refurbishment works were low. This resulted in an under-diagnosis of poor performing assets, and a subsequent increase in equipment failures, some catastrophic. This was also coupled with significant load growth, driven largely by the prevalence of inexpensive household air conditioning. Asset systems at this time were immature and poorly utilised. This meant that recording of asset maintenance and failure history was inconsistent, with much of the relevant information remaining within local regions.

In the early 2000s, there was recognition that both the maintenance and replacement strategies were inadequate to deal with both an ageing and expanding network. Failures on a variety of different assets were being experienced due to a combination of ineffective maintenance and assets further degrading in condition, thus reaching the end of their serviceable lives. In order to begin to remedy this situation, a holistic approach to the management of assets was adopted. This included a full review and revision of Ausgrid's maintenance standards to ensure that objectives were consistent across the organisation. The first set of targeted replacement programs was also developed. These replacement programs targeted particular types of assets that carried high risks and were no longer economically sustainable to continue to maintain.

By the mid-2000s, maintenance completion was improving, as was the collection and accuracy of asset related data. The number of replacement programs had increased and specific duty of care programs were introduced to ensure asset compliance with specific regulatory and statutory obligations.

In 2006, work began on developing an enterprise integrated asset management system, to improve the management of network assets and provide a link between these assets, as well as the financial outcomes. This system would also allow more accurate reporting of maintenance and failure data meaning that asset failure rates and maintenance performance could be more readily analysed. Whilst the full enterprise system was developed, an interim system was put in place in order to collect information that was used for the preparation of the 2009-14 regulatory proposal.

The SAP ERP platform went live on 5 January 2009. There have been many challenges with implementing an integrated asset management system. During this regulatory period the system has undergone continuous improvement and development to continue to discover the benefits it can provide for Ausgrid's system maintenance programs.

Some of the key benefits that the introduction of SAP has provided for system maintenance include the following:

- The automatic application of maintenance plans to new network assets.
- The automatic generation of inspection maintenance tasks from the network maintenance plans.
- The development of the corporate dashboard to allow reporting on inspection maintenance task completion.
- The capture of costs associated with all maintenance activities within the system maintenance matrix to allow interrogation and analysis of costs.
- For individual assets classes, failure modes identified using the FMECA/RCM analysis are captured using a customised catalogue profile that presents the known failures in a tree allowing the end user to select the appropriate failure mode. Users can also enter unknown failure modes that are then analysed as part of the maintenance requirements analysis process.
- The capture of costs and technical details of asset failures.

The benefits of SAP have given Ausgrid more detailed asset technical and financial information, improving the way maintenance program and asset performance are monitored during the current 2009-14 regulatory period. This approach will ensure Ausgrid can continue to review, refine and where appropriate, make changes to our maintenance programs to ensure our asset management strategic objectives can be met in the most cost efficient way possible during the 2014-19 regulatory period and beyond.

When considering the significant increase in Ausgrid's asset base and the subsequent reduction in total operational expenditure observed during the 2009-14 regulatory period, it is evident that the benefits outlined above are continuing to be realised through the on-going process of continuous improvement.

1.2 Outcomes during the 2009-14 period

The operational expenditure that Ausgrid expect to spend in relation to system maintenance during the 2009-14 regulatory period is shown in Table 2.

Despite the year to year variations, Ausgrid has still performed very well against the allowance, whilst achieving all of our objectives that we set for the 2009-14 regulatory period in relation to the requirements for our system maintenance programs.

The differences in the variations between financial years are explained in the following sections when the expenditure is discussed in more detail within each cost category.

$K (nominal)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Operating expenditure	227,209	224,577	220,744	225,361	239,093	1,136,984
Allowance	208,473	216,645	229,660	240,624	249,152	1,144,554
Variance to Allowance	18,736	7,932	-8,916	-15,263	-10,059	-7,570

Table 2 –Total system maintenance operating expenditure compared to the allowance

This expenditure can be further broken down into the following cost categories and asset groups shown in *Table 3* and *Table 4*:

$K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
PM01 Inspection	94,216	99,549	90,115	88,916	92,534	465,330
PM02 Corrective	64,860	55,112	54,022	54,081	54,569	282,644
PM03 Breakdown	53,519	51,545	49,240	53,396	53,867	261,567
PM04 Nature Induced Breakdown	7,846	8,595	7,528	10,045	10,135	44,148
PM05 Damage by Third Party	5,820	6,094	8,741	4,732	6,651	32,039
PM08 Non-Direct Maintenance	1,517	1,151	1,235	705	711	5,318
PM09 Engineering Support	25,754	23,915	24,126	20,419	20,626	114,840
Total	253,532	245,961	235,007	232,294	239,093	1,205,886

Table 3 –System maintenance operating expenditure breakdown by cost category

$K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains Overhead	6,971	9,343	9,843	8,907	9,122	44,186
Transmission Mains Underground	10,823	12,075	14,072	13,103	13,326	63,400
Transmission Substations	12,949	10,614	8,993	6,804	6,865	46,225
Zone Substations	44,373	30,735	29,794	28,381	28,696	161,980
Distribution Mains	150,522	148,023	139,208	140,059	145,537	723,348
Distribution Substations	27,893	35,171	33,097	35,040	35,546	166,747
Total	253,531	245,961	235,007	232,294	239,092	1,205,886

Table 4 –System maintenance operating expenditure breakdown by asset group

When examining maintenance performance during the 2009-14 regulatory period, both outcomes and expenditure should be considered. The various outcome metrics, in conjunction with overall expenditure, help demonstrate both the veracity of the forward forecasting process and the effectiveness and prudency of the maintenance programs. Figure 2 shows maintenance operating expenditure against the allowance set in Ausgrid's 2009-14 determination. It can be seen from this graph that Ausgrid has performed very well against the determination.

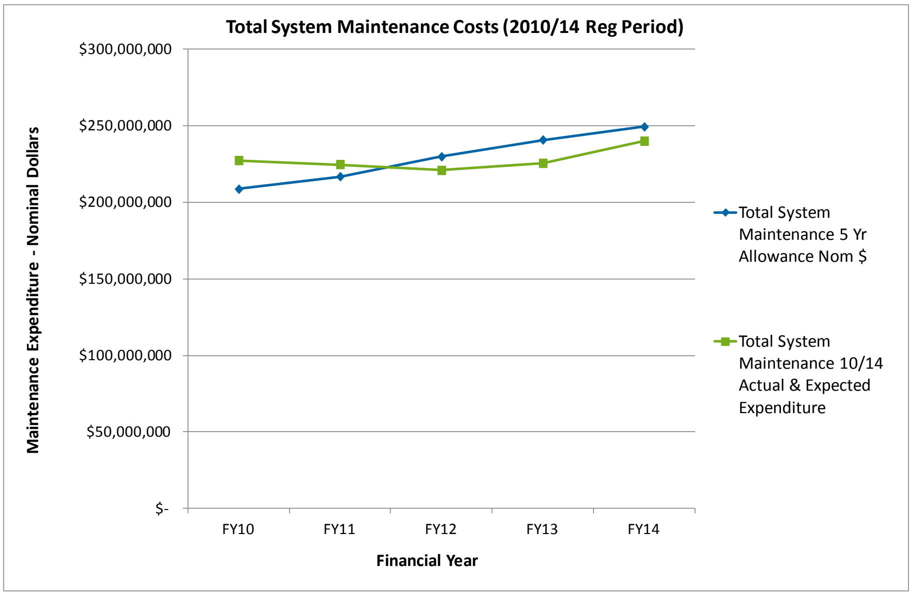

Figure 2 — Total system maintenance costs (nominal dollars) 2009-14 regulatory period

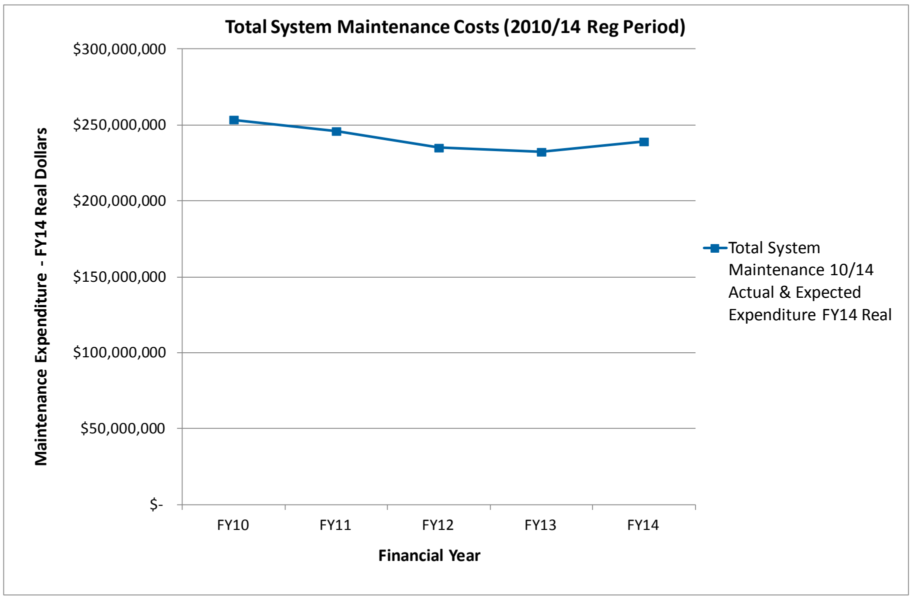

Figure 3 — Total system maintenance costs (2013-14 real dollars) 2009-14 regulatory period

The growth in Ausgrid's system assets between 2006 and 2012 are shown below in Table 5. Some of the most significant increases to the Ausgrid system asset base populations occurred in the following asset classes:

- Transmission and Zone substations.
- Transmission and Zone substation 132kV, 66kV and 33kV circuit breakers.
- Transmission and Zone substation power transformers.

This high growth can be attributed to the significant capital program delivered over the past two regulatory periods, where Ausgrid addressed capacity issues and asset condition issues through the construction of new Transmission and Zone substations and the replacement of individual assets.

Transmission and Zone substation assets such as circuit breakers and power transformers are expensive and complicated in construction and generally attract high maintenance costs.

Assets	Count @ June 2006	Count @ Feb 2012	Increase	% Variation
132 kV O/H ccts steel towers	721	748	27	4%
SubTransmission Subs (incl Sw Stns)	40	49	9	23%
132 kV CBs Total	364	535	171	47%
132 kV CBs TS	241	339	98	41%
132 kV CBs ZN	123	196	73	59%
66 kV CBs Total	107	139	32	30%
66 kV CBs TS	33	51	18	55%
66 kV CBs ZN	74	88	14	19%
33 kV CBs Total	953	1027	74	8%
33 kV CBs TS	504	590	86	17%
33 kV CBs ZN	449	437	-12	-3%
11/22 kV CBs	3251	3494	243	7%
Zone Substations	176	198	22	13%
Zone Transformers Total	465	502	37	8%
132 / 11 kV Zone Transformers	100	143	43	43%
66 / 11 kV Zone Transformers	39	47	8	21%
33 / 11 kV Zone Transformers	326	312	-14	-4%
Distribution centres	29006	30945	1939	7%
Distribution centre transformers	31559	32694	1135	4%
Poles	500705	510876	10171	2%
LV Pillars	38185	44840	6655	17%

Table 5 –Growth in assets between 2006 and 2012

When the overall system maintenance expenditure outcome is examined in real FY2013-14 dollars (Figure 3), it can be seen that despite a significant increase to the Ausgrid asset base shown in Table 5, and therefore the requirement to undertake more maintenance activities, maintenance expenditure overall has actually reduced during the last five years. This further demonstrates the efficiencies and savings achieved in delivering Ausgrid's maintenance programs for the 2009-14 regulatory period.

1.2.1 Outcomes during the 2009-14 period - Inspection

The breakdown of costs for the inspection cost category is presented in Table 6 to allow separation of the costs associated with vegetation management and the costs associated with all other system maintenance routine inspection tasks. When considering the performance of the inspection maintenance cost category in Figure 4, it is evident that there has been a very stable delivery of planned routine maintenance tasks during the 2009-14 regulatory period. This graph includes the expenditure for all planned routine maintenance tasks within the six main asset groups, but does not include the expenditure for vegetation management activities.

$K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
PM01 Inspection - All	94,216	99,549	90,115	88,916	92,534	465,330
PM01 Inspection Vegetation Management	38,052	43,371	38,011	37,619	40,785	197,838
PM01 Inspection – All Asset Groups (excluding veg management)	56,164	56,178	52,104	51,297	51,749	267,492

Table 6 – inspection expenditure breakdown 2009-14 regulatory period

The decrease in task volumes observed between FY2011-12 and FY2012-13 in Figure 5 is due to the adjustment of the maintenance cycle frequency for pole inspection from a four yearly inspection to a five yearly inspection. This decrease was significant as a percentage of the total task volumes (due to the significant volume of poles), however, was offset by the introduction of the fire system maintenance tasks into SAP during FY2012-13. Ausgrid has always undertaken fire system asset maintenance activities, however, did not previously capture the costs within the system maintenance matrix or track the required and completed tasks using the automated process for generating maintenance plans within SAP. The net decrease in task volumes between FY2011-12 and FY2012-13 is therefore a result of the full implementation of the new pole inspection maintenance plan tasks and introduction of the fire system maintenance inspection tasks within SAP. It must be noted that the apparent small increase in task volumes between FY2012-13 and FY2013-14 is due to the presentation of completed tasks for the previous four financial years of the regulatory period, and the number of required tasks for FY2013-14.

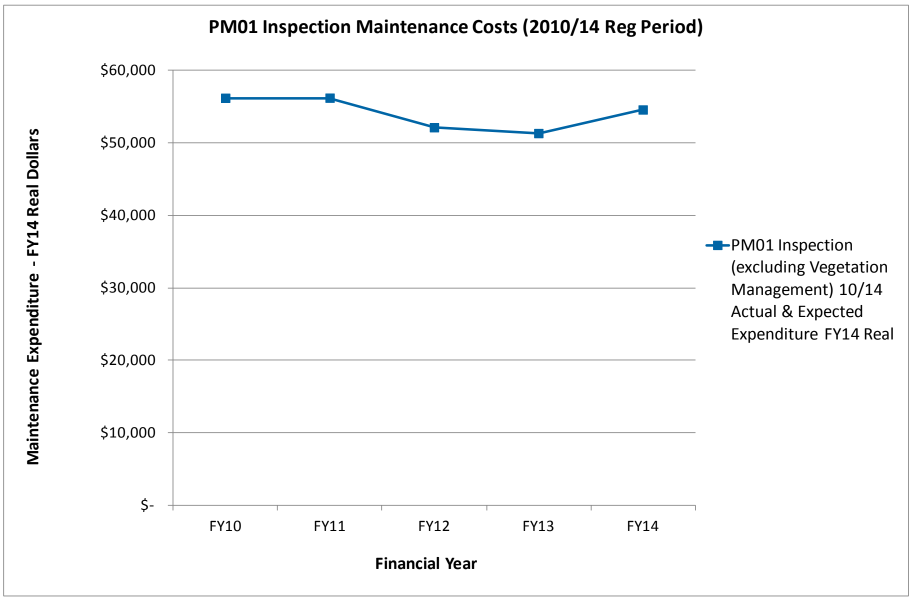

Figure 4 — PM01 inspection maintenance costs (excluding veg management) 2009-14 regulatory period

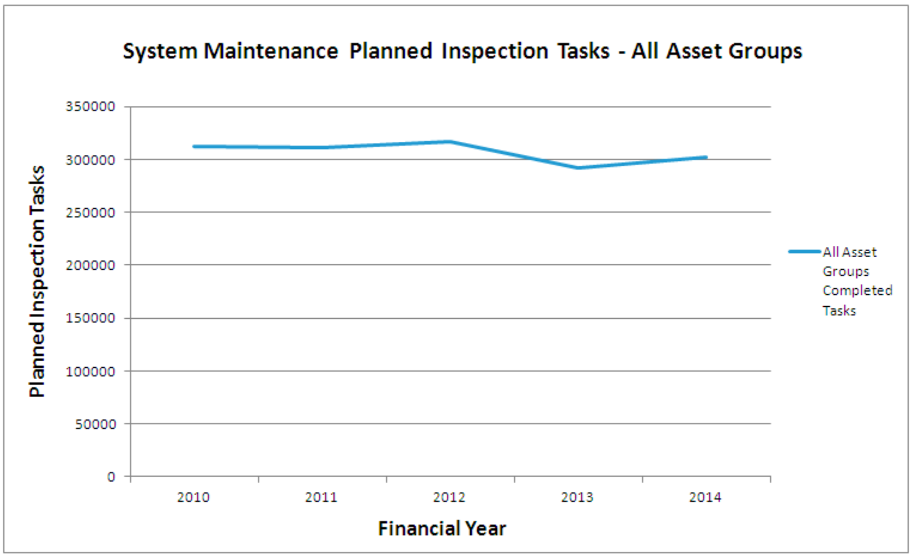

Figure 5 — PM01 inspection maintenance tasks FY10-FY14

The actual expenditure and number of completed inspection tasks by asset group is presented in Table 7 and Table 8. It must again be noted that the number of tasks presented in Table 8 for FY2013-14 is the required number of tasks.

Inspection **$K (FY14 real)**	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**Total**
Transmission Mains OH (Excluding Veg Management)	504	533	884	1,590	1,613	5,124
Transmission Mains UG	2,306	2,452	2,145	2,810	2,836	12,549
Transmission Substations	3,234	3,270	3,223	2,832	2,858	15,417
Zone Substations	11,054	9,707	9,735	10,595	10,690	51,782
Distribution Mains (Excluding Veg Management)	31,286	30,118	26,602	21,566	21,741	131,313
Distribution Substations	7,780	10,097	9,515	11,903	12,010	51,305
Total	56,164	56,177	52,104	51,296	51,749	267,492

Table 7 – Inspection expenditure breakdown 2009-14 regulatory period by asset group

Inspection Completed Tasks	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH (Excluding Veg Management)	12605	14313	17747	13656	11479	69800
Transmission Mains UG	649	576	584	722	861	3392
Transmission Substations	5142	4492	5147	7852	9073	31706
Zone Substations	28865	22935	29892	34013	37006	152711
Distribution Mains (Excluding Veg Management)	248385	254725	247504	211639	217077	1179330
Distribution Substations	16115	14079	16032	24093	26749	97068
Total	311761	311120	316906	291975	302245	1534007

Table 8 – Inspection completed tasks 2009-14 regulatory period

Figure 6 and Figure 7 show the completion of planned tasks in the substation and mains areas, respectively, for the current 2009-14 period, and historically back to financial year 2004-05. These two graphs demonstrate the now exceptional completion rate of planned maintenance tasks across Ausgrid. However, despite the generally exceptional completion rate overall for both substation and mains maintenance activities during the 2009-14 regulatory period, there was a below average completion rate for the substation maintenance tasks during the 2012-13 financial year.

This below average completion rate for the substation maintenance tasks in the 2012-13 financial year was due to the identification of asbestos in many of Ausgrid's Transmission, Zone and Distribution substations. This resulted in the immediate need to engage a hygienist to perform an asbestos assessment to determine the risk associated with the different asbestos products. This process would then generally lead to the removal of the high risk asbestos products, before planned maintenance tasks could be safely undertaken.

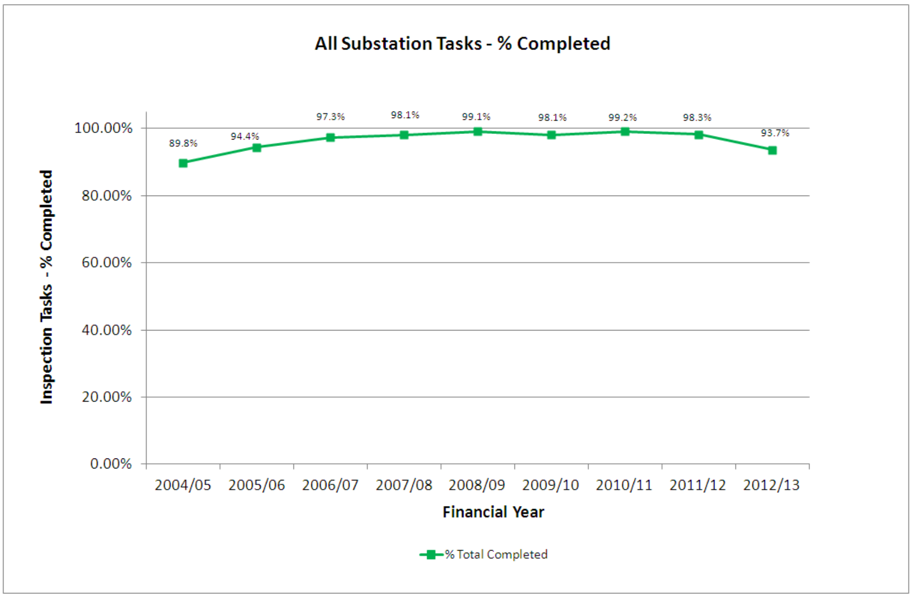

Figure 6 — Completion of planned substation maintenance tasks

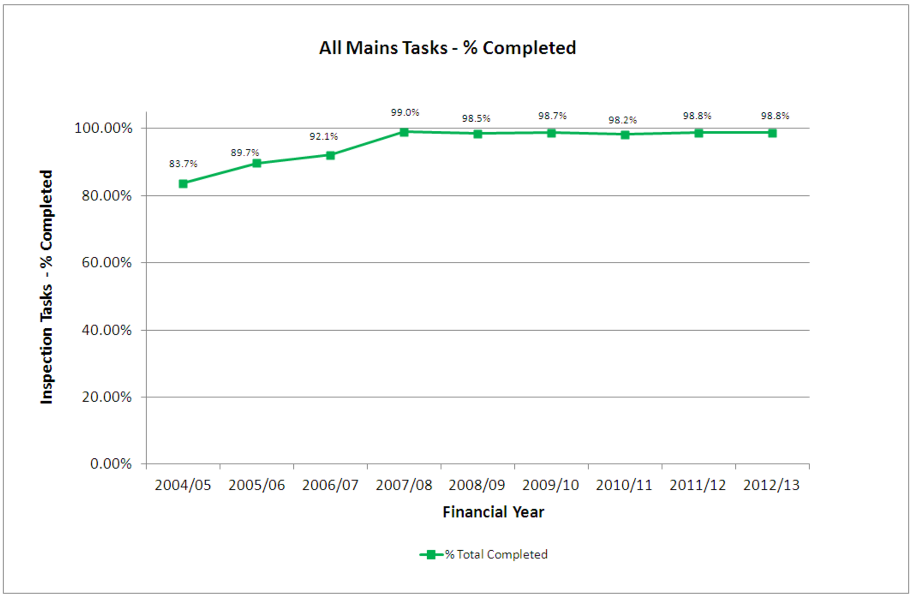

Figure 7 — Completion of planned mains maintenance tasks

1.2.1.1 Outcomes during the 2009-14 period – Vegetation Management

The breakdown of vegetation management costs during the 2009-14 regulatory period split by Distribution Mains and Transmission Mains OH within the inspection cost category is presented in Table 9.

$K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
PM01 Inspection (Distribution Mains) – Vegetation Management	36,916	42,117	36,785	36,344	39,415	191,577
PM01 Inspection (Transmission OH Mains) – Vegetation Management	1,137	1,255	1,226	1,275	1,370	6,263
Total	38,052	43,371	38,011	37,619	40,785	197,838

Table 9 –Vegetation management operating expenditure

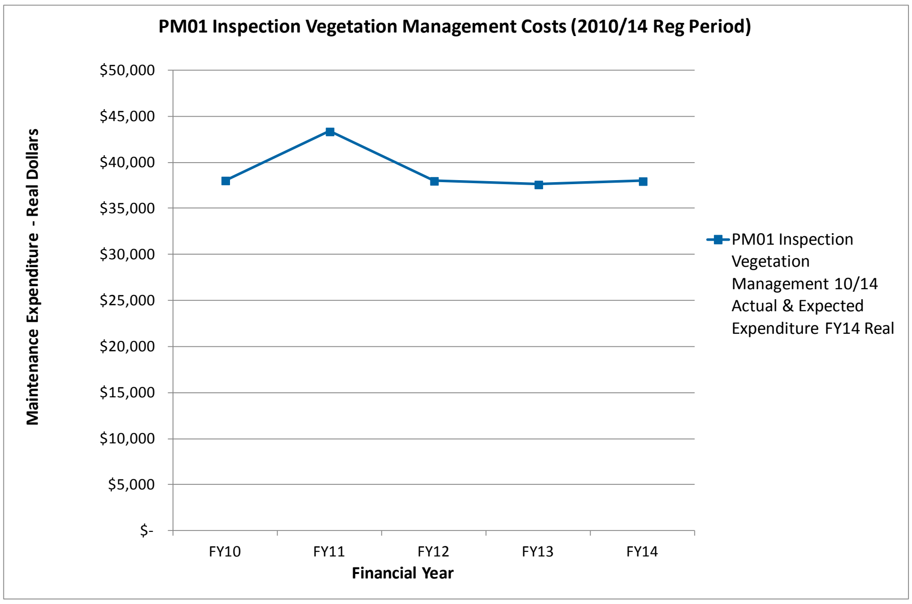

Figure 8 — PM01 vegetation management maintenance costs 2009-14 regulatory period

When considering the performance of the maintenance cost sub-category presented in Figure 8, it is evident that during FY2009-10, FY2011-12 and FY2012-13, there was a stable investment in vegetation management activity. The increased expenditure in FY2010-11 was higher due to the timing of payment processing. A shortfall in the accrual process for prior year costs has resulted in a number of vegetation management contract payments for FY2009-10 services not being accrued before being paid in FY2010-11. Conversely, there were also a number of vegetation management contracts where Ausgrid processed payments early in June 2012 that would normally have been paid in July 2012. Therefore, FY2010-11 actually incurred fourteen monthly payments instead of twelve for a number of contracts. These factors explain the apparent elevated expenditure in FY2010-11.

The increased expenditure shown in the current financial year 2013-14, is due to the renewal of two contracts in the Hunter area. The strategy for vegetation management is explained in more detail in Section 2 and in Appendix A, which describes the contract renewal process and subsequent increases in required expenditure.

1.2.2 Outcomes during the 2009-14 period – Corrective and Breakdown

When considering the performance of the corrective and breakdown maintenance cost categories presented in Figure 9 and Figure 10, it is evident that there has been a very stable investment in these two maintenance categories. Ausgrid has achieved all the requirements for non-routine maintenance activities during the 2009-14 regulatory period.

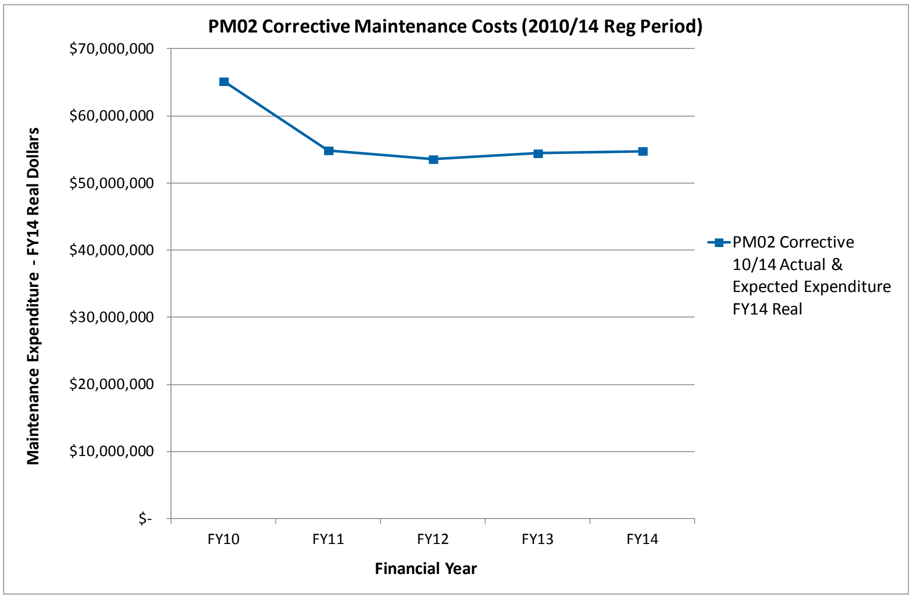

Figure 9 — PM02 corrective maintenance costs, 2009-14 regulatory period

The actual expenditure by asset group for the corrective cost category is presented in Table 10.

Corrective $K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH	2,186	2,955	3,552	3,863	3,897	16,453
Transmission Mains UG	4,202	4,285	5,496	4,918	4,963	23,863
Transmission Substations	1,794	2,584	3,040	2,122	2,141	11,682
Zone Substations	20,399	9,464	7,463	9,814	9,903	57,042
Distribution Mains	27,820	23,789	22,985	22,127	22,326	119,047
Distribution Substations	8,459	12,035	11,487	11,237	11,338	54,556
Total	64,860	55,112	54,022	54,081	54,569	282,644

Table 10 – Corrective expenditure 2009-14 regulatory period

The increase in costs incurred during FY2009-10 relate to the recognition of one-off costs associated with site and asbestos remediation of $13.6m (nominal FY2009-10 terms).

There is a direct relationship between routine planned inspection tasks and non-routine corrective tasks. The outcome of inspection tasks is to identify corrective defects before an asset reaches the point where a breakdown failure occurs. By comparing the inspection and the corrective cost categories, it can be observed that both categories have remained very stable over the 2009-14 regulatory period. This demonstrates an appropriate balance between routine and non-routine activities.

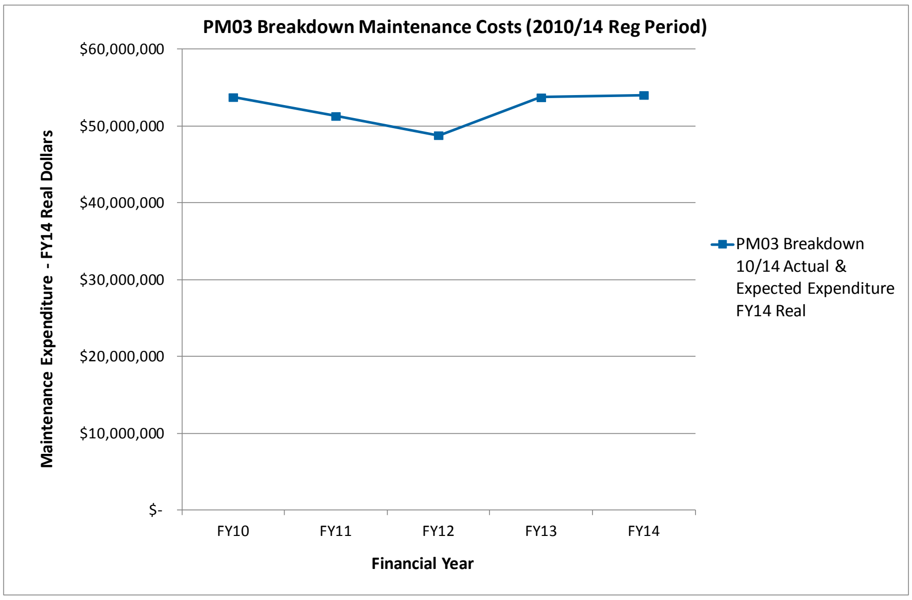

Figure 10 — PM03 breakdown maintenance costs, 2009-14 regulatory period

The actual expenditure by asset group for the breakdown cost category is presented in Table 11.

Breakdown $K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH	555	611	911	1,041	1,050	4,169
Transmission Mains UG	2,892	3,222	2,354	4,257	4,295	17,020
Transmission Substations	1,647	2,076	1,344	1,514	1,527	8,108
Zone Substations	4,595	4,164	3,994	4,840	4,882	22,475
Distribution Mains	38,165	36,424	35,883	36,864	37,190	184,525
Distribution Substations	5,665	5,049	4,753	4,880	4,923	25,269
Total	53,519	51,545	49,240	53,396	53,867	261,567

Table 11 – Breakdown expenditure 2009-14 regulatory period

In order to demonstrate the efficiency and prudency of the expenditure and tasks undertaken, it is necessary to examine the relationships between inspection and corrective and breakdown activities. Allowing an asset to reach the point of breakdown will result in much higher costs than addressing issues through inspection or corrective maintenance activities. This is due to the fact that allowing an asset to reach the point of breakdown results in the realisation of one or more of the following risks:

- Safety.
- Environmental.
- Damages/liability.
- Adverse publicity.
- Reliability.

Although maintenance strategies come at the cost of inspection, they pay dividends in the avoidance of corrective and breakdown costs. It can also be seen from Figure 9 and Figure 10 that over the last five years, breakdown and corrective costs have remained stable and contained. This is an indication of an optimal inspection regime that minimises the number of corrective and breakdown tasks to a prudent and efficient cost level.

1.2.3 Outcomes during the 2009-14 period – Nature Induced Breakdown

When reviewing the performance of this particular cost category during the 2009-14 regulatory period shown in Figure 11, it must be noted that these costs are driven by the effects of external natural occurring disasters such as floods, storms and bushfires. During the current regulatory period, the expenditure was largely erratic and volatile which can be expected for this particular cost category.

There were two Major Event Days (MEDs) that explain the elevated expenditure during the 2012-13 financial year which was the result of two major wind storms which occurred in August 2012 and February 2013.

The event counts for FY10-FY13 are shown in Figure 12. The two MEDs displayed on the yearly event count graph further emphasise the relationship between the MEDs and the subsequent increase in maintenance costs within the nature induced breakdown cost category in financial year 2012-13.

Ausgrid has completed all nature induced breakdown emergency response activities that were required during the 2009-14 regulatory period to maintain a safe and reliable network.

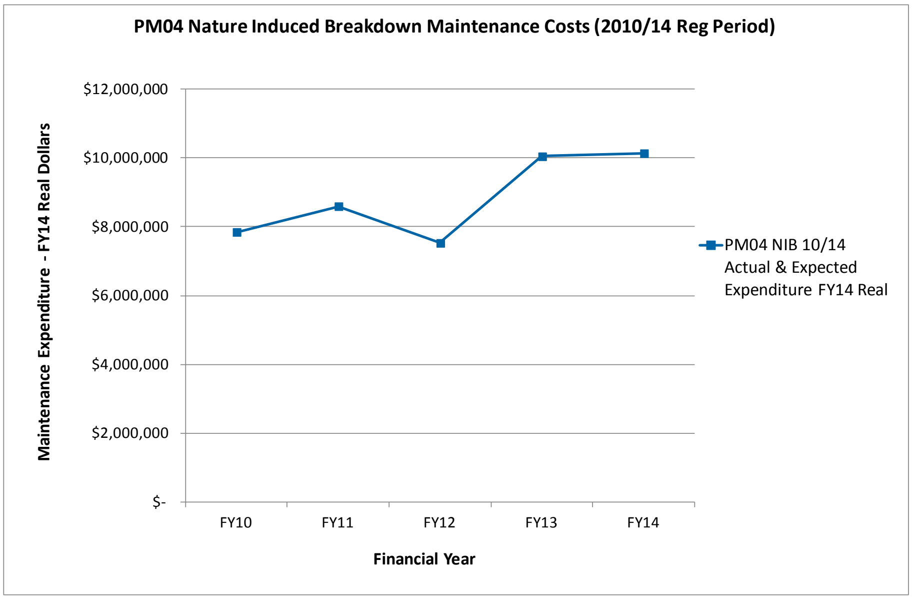

Figure 11 — PM04 nature induced breakdown maintenance costs, 2009-14 regulatory period

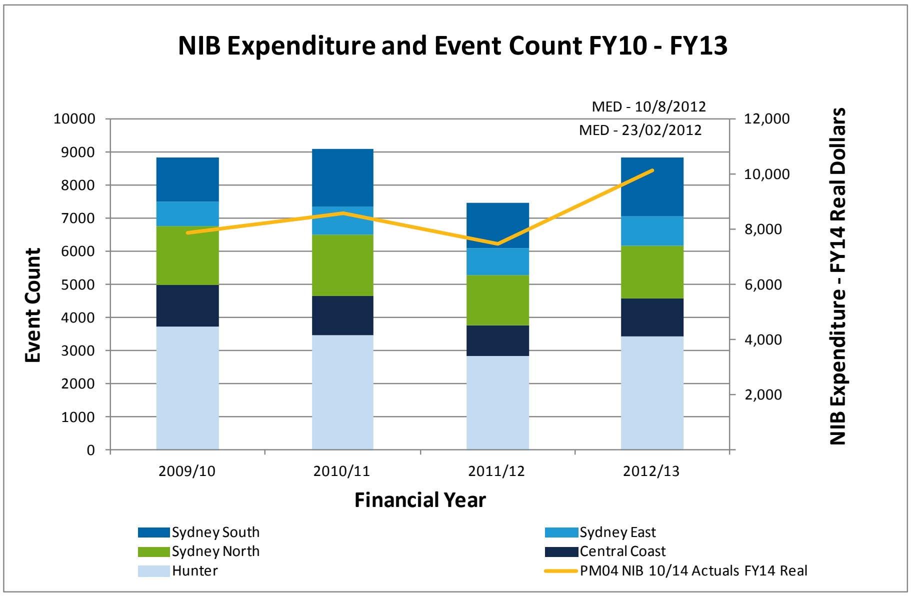

Figure 12 — Event count & NIB expenditure FY10-FY13

The actual expenditure and number of completed nature induced breakdown tasks by asset group for the nature induced breakdown cost category is presented in Table 12.

Nature Induced Breakdown $K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH	396	315	420	434	438	2,003
Transmission Mains UG	9	13	39	3	3	67
Transmission Substations	66	69	83	74	75	367
Zone Substations	146	275	332	222	224	1,198
Distribution Mains	6,436	7,271	6,184	8,807	8,886	37,583
Distribution Substations	792	651	471	506	510	2,929
Total	7,846	8,595	7,528	10,045	10,135	44,149

Table 12 – Nature induced breakdown expenditure 2009-14 regulatory period

1.2.4 Outcomes during the 2009-14 period – Damage by Third Party

When reviewing the performance of this particular cost category during the 2009-14 regulatory period shown in Figure 13, it must be noted that these costs are driven by the effects of external vandalism, traffic events or other physical interference such as the accidental excavation and damage of a transmission mains underground cable. During the current regulatory period, the expenditure was largely erratic and volatile which can be expected for this particular cost category.

Ausgrid has completed all damage by third party emergency response activities that were required during the 2009-14 regulatory period to maintain a safe and reliable network.

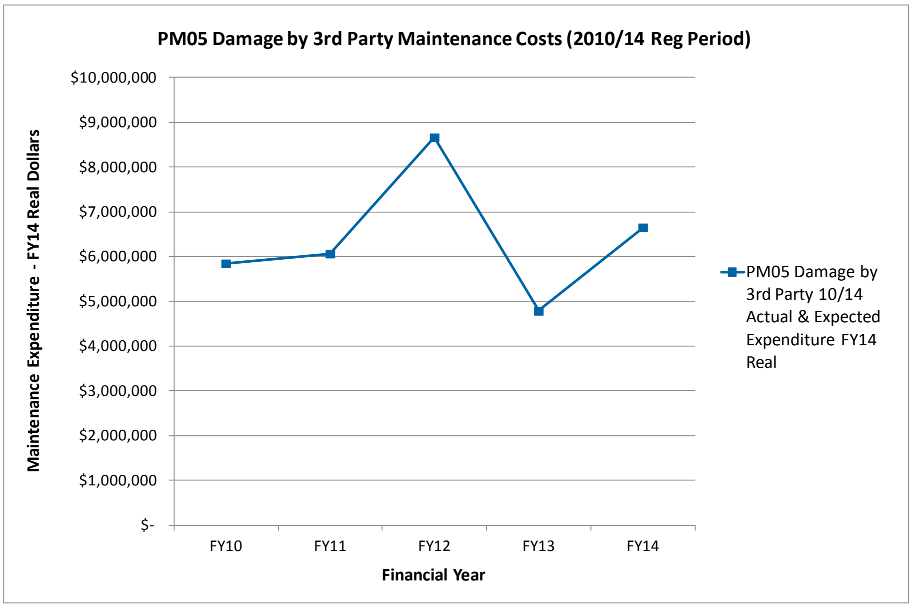

Figure 13 — PM05 damage by third party maintenance costs, 2009-14 regulatory period

The actual expenditure by asset group for the damage by third party tasks cost category is presented in Table 13.

The AER has given Ausgrid advice that this cost category will no longer be classified as a Standard Control Service from 1 July 2014 and therefore, forecast expenditure for the 2014-19 regulatory period has not been provided within this document and will not form any part of the system maintenance forecast.

Damage by Third Party $K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH	242	233	177	107	151	910
Transmission Mains UG	310	346	1,894	263	369	3,182
Transmission Substations	29	10	12	0	0	51
Zone Substations	13	0	45	148	207	413
Distribution Mains	4,124	4,994	5,843	3,749	5,269	23,979
Distribution Substations	1,101	510	771	466	655	3,504
Total	5,820	6,094	8,741	4,732	6,651	32,039

Table 13 – Damage by third party expenditure 2009-14 regulatory period

1.2.5 Outcomes during the 2009-14 period – Non-Direct Maintenance and Engineering Support

As outlined in the introduction, these two cost categories include all work associated with the testing of plant, tools and equipment that is used to deliver the different maintenance activities and the work associated with preparing asset engineering standards, maintenance analysis, engineering investigations and maintenance planning, scheduling and coordination.

When reviewing the performance of these particular cost categories during the 2009-14 regulatory period shown in Figure 14, it can be observed that the expenditure during the 2009-14 regulatory period in 'real' terms demonstrates a reducing trend.

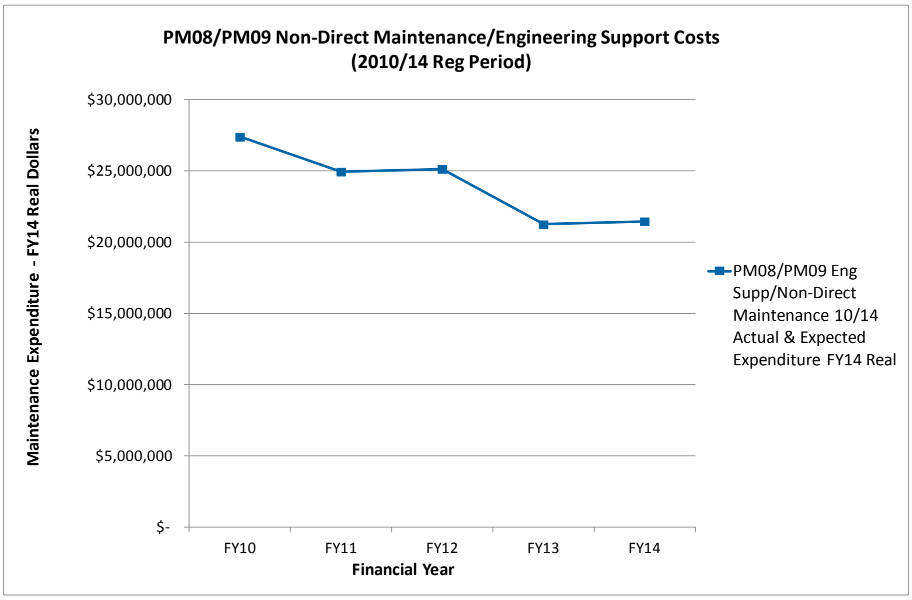

Figure 14 — PM08 non-direct maintenance & PM09 engineering support costs 2009-14 regulatory period

The actual expenditure by asset group for the non-direct maintenance and engineering support cost categories is presented in Table 14.

Non-Direct Maintenance and Engineering Support $K (FY14 real)	2009-10	2010-11	2011-12	2012-13	2013-14	Total
Transmission Mains OH	1,951	3,441	2,673	597	603	9,264
Transmission Mains UG	1,104	1,755	2,145	852	860	6,717
Transmission Substations	6,179	2,605	1,290	262	264	10,600
Zone Substations	8,165	7,126	8,225	2,762	2,790	29,069
Distribution Mains	5,776	3,310	4,927	10,602	10,710	35,324
Distribution Substations	4,096	6,829	6,101	6,049	6,110	29,184
Total	27,271	25,065	25,361	21,124	21,337	120,158

Table 14 – Non-direct maintenance and engineering support expenditure 2009-14 regulatory period

1.3 Variations to allowance

During the 2009-14 regulatory period, operating expenditure for system maintenance has underspent the AER allowance by $7.57M.

The AER allowance for Ausgrid's system maintenance operating expenditure was an efficient allowance which allowed Ausgrid to deliver all the requirements of its maintenance programs whilst not compromising on any of its operational expenditure objectives contained in clause 6.5.6(a) of the NER.

1.4 Maintenance Requirements Analysis Review

Ausgrid uses the Failure Modes and Effects Criticality Analysis (FMECA) and Reliability Centred Maintenance (RCM) processes for determining maintenance requirements. This internationally recognised process provides a structured method for:

- Assessing the likely causes of asset failure.
- Assessing the consequences of that failure.
- Determining tasks that can be undertaken in order to prevent a failure occurring or detect a deterioration in condition.

During 2010-11, a major review of maintenance requirements was undertaken. This review was undertaken to ensure the network technical maintenance plans for Ausgrid's network assets remained aligned with current asset management objectives, asset performance and legislative and statutory requirements. The reviews undertaken addressed close to 97% of the routine maintenance tasks contained in SAP, and over 300,000 corrective and breakdown events were analysed. This allowed current defect rates to be compared to those from the original analysis to determine any potential changes in maintenance tasks and/or periods to produce an updated maintenance task package that reflects the most efficient and cost effective investment in routine maintenance activities.

This is a dynamic process that is repeated on a periodic basis and is used to refine the planned maintenance tasks in response to the performance and/or condition degradation during the life of an asset.

The trade-off between the costs required to undertake certain planned maintenance tasks, and the potential cost of failure are examined in order to determine an optimised package of task and timing requirements.

As a result of the review undertaken during 2010-11, the maintenance period has been extended for some inspection tasks and where possible the latitude has been increased to allow the operations field staff more flexibility in planning and scheduling tasks, providing the opportunity to bundle tasks and create greater task efficiency/resource utilisation in delivery of the system maintenance program.

Investment in system maintenance observed during the current 2009-14 regulatory period in 'real' terms, demonstrates a reducing trend, whilst growth in network assets shown in Table 5 was shown to be increasing. This further demonstrates that efficiencies from the maintenance requirements analysis review were realised in delivering the system maintenance program for the 2009-14 regulatory period.

2014-19 System Maintenance strategy

The purpose of this section is to identify the key circumstances driving Ausgrid's system maintenance operating expenditure in the 2014-19 regulatory period. At a high level, it can be seen in Figure 15 that the underlying base year forecast for the 2014-19 regulatory period is largely consistent with the operating expenditure from the 2009-14 period.

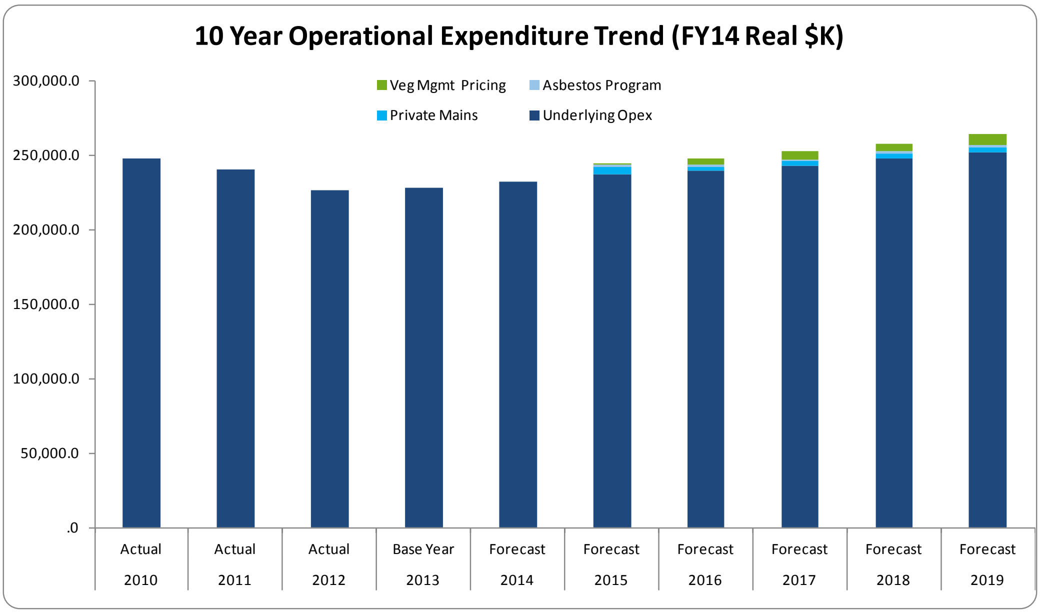

Figure 15 — 10 year operational expenditure trend for system maintenance

2.1 Strategy

Our strategy for system maintenance for the 2014-19 regulatory period is to continue to ensure that our assets provide their necessary functions, by preserving them in a safe and reliable condition, through the cost effective delivery of programmed maintenance tasks. Where assets fail unexpectedly, or fail to meet prescribed criteria, Ausgrid will restore these assets to the required state through the most cost effective means. At the same time we have sought to minimise price pressures to the full extent possible by investigating avenues of efficiency either in scope or delivery of the forecast maintenance activity or investment in capital.

Ausgrid will continue to monitor the trends of costs and outcomes of its maintenance programs to ensure that the programs are efficient and prudent. Internal reporting will be carried out to ensure completion of required programmed maintenance tasks, as well as timely completion of outstanding corrective and breakdown works. Expenditure will also be monitored to ensure that costs are within budget.

Where groups of assets are showing signs of deterioration, increasing failure rates and subsequent increases in maintenance costs, analysis will be undertaken to determine the cause and identify the correct course of action to be taken.

The strategy for system maintenance must continue to be underpinned by the overall asset management strategic plan to ensure that Ausgrid can continue to successfully manage its assets and achieve the most cost effective balance between operating and capital expenditure.

Capital replacement programs cater for assets whose condition has degraded to a point where the condition is no longer considered safe, environmentally compliant or economically maintainable.

Capital replacement programs seek to replace assets that:

- Are in poor condition, as shown by test results, physical inspections, and failure history.
- Pose significant safety risks, as demonstrated by previous incidents, external reports, test results, failure history and risk analysis.
- Do not meet statutory obligations.
- That can no longer be cost effectively maintained, as demonstrated by Maintenance Requirements Analysis.
- That can no longer be safely maintained, as demonstrated by non-compliance with Ausgrid's safety criteria.

Ausgrid's replacement programs must be closely aligned with its maintenance programs to ensure that assets are not replaced unnecessarily. This means that replacement is considered where economically prudent to do so. The feasibility, costs and risks of all the potential options are assessed in order to make an appropriate investment decision.

More detail on the replacement strategy can be found in the Replacement and Duty of Care Overview document.

If new types of assets are added to the network in the 2014-19 regulatory period, maintenance requirements analysis will be undertaken to determine an optimised set of maintenance task and timing requirements. This ensures that the most cost effective maintenance task package is applied to new assets from the moment that they form part of the Ausgrid network.

The 2014-19 regulatory period will see the introduction of inspection, testing and maintenance requirements for private mains. These changes will increase system maintenance costs and are required to fulfil a number of statutory and legislative requirements, as well as to provide the required level of asset and system reliability. The details of these additional requirements are contained in Section 2.5 of this document.

2.2 Key operational drivers and variables

During the 2014-19 period, and based on the current planned level of asset replacement, it is expected that the underlying system maintenance program and associated operational drivers will remain stable and unchanged. However, there will be an overall increase in system maintenance due to the inclusion of private mains inspection tasks, a more comprehensive asbestos audit and inspection program and the contract renewal increases for vegetation management maintenance activities. More detail on these growth factors can be found in Section 2.4.

2.2.1 Vegetation Management

The contract renewal increases to the vegetation management inspection maintenance category result in the forecast expenditure increasing by greater than CPI escalation.

The structure and scope of Ausgrid vegetation management contracts consist of maintenance and compliance. We tender and award contracts based on regional areas. These regional areas consist of a number of local government areas. In general there are two companies awarded within each region which in turn maintain direct competition for additional works, and to maintain alternatives in the event of an underperforming contractor. Once awarded, the contractor is responsible for ensuring vegetation clearances are maintained by undertaking the scoping, cutting and auditing required to achieve compliance. The contract structure is for an initial three year period with six one year options. The annual options are issued based on satisfactory performance in the prior year and if approved, the contract cost increases are in line with the prescribed labour index by applying the percentage increase or decrease to the schedule rates in the Contract for the extended term approved. The basis of the index applied is the average of the Wage Price Index 6345 and Consumer Price Index 6401.

This structure is designed to obtain maximum value from the market by enticing lower cost models from the offer of long term stability, which in turn allows contract companies to have a stable cost base for plant and equipment. In turn, if performance is not deemed satisfactory, the contract term is easily reduced by not awarding an extension year/s. This model offers the best value for Ausgrid in containing costs as the annual extensions are negotiated in line with a labour index. This also allows accurate estimation of costs for the life of the contract after the initial tendered period.

Performance of the contract is managed through a Key Performance Indicator (KPI) system. This system uses performance criteria set against key objectives of the contract such as quality, safety and environment. Reports are run quarterly and used in the day to day management of the contract, however, they are also the basis of the annual report that is used to determine eligibility for extension periods. The system is effective in measuring and driving consistent performance throughout the contract period and not just at specific key points in time.

The majority of the current contracts commenced in 2006 and have run for between seven and nine year periods, and as a result are nearing the completion of their contract periods. Further information on the current contracts and strategy for vegetation management for the 2014-19 regulatory period can be found in Appendix A.

2.3 Relationship with capital program

The objective of Ausgrid's maintenance and replacement strategy is to ensure prudent investment, leading to maximum return on assets within an acceptable level of risk. This strategy ensures minimum whole of life cost and is aligned with Ausgrid's business purpose to efficiently distribute electricity to its customers in a way that is safe, reliable and sustainable. The processes used to determine replacement requirements are consistent with those applied in determining maintenance. An asset lifecycle consists of the following four stages:

- Plan
- Acquire
- Use & Maintain
- Dispose.

The process for determining the requirements for replacement starts with an understanding of the way maintenance costs and risks change over time. Maintenance Requirements Analysis (MRA) provides a view of how inspection, maintenance and repair costs will increase over time. At a point in time, it becomes uneconomic to continue to extend the life of an asset compared with investment in renewal.

As assets age their condition deteriorates, this leads to increased maintenance costs, likelihood of failure and the consequent impacts become more significant. There are several elements considered in the decision to replace:

- Cost of ongoing routine maintenance and repair
- Likely cost of reactive replacement in the event of a failure
- Likely impact of loss of supply or deteriorating reliability
- Safety, environmental or other risks that would arise in the event of failure.

Each of these elements pose a risk to the business and are assessed against the likely cost of a replacement strategy in a cost benefit analysis to determine an optimum time for renewal of an asset or asset class.

This approach has been consistent over the past regulatory period and continues with the same objectives into the future. This consistent approach means that the balance between investment in replacement and expenditure on maintenance remains in a similar balance over time.

2.4 Growth Factors

The forecast expenditure for the 2014-19 period includes the inspection of private mains and asbestos containing materials.

2.4.1 Private Mains

The strategy for the 2014-19 regulatory period is to ensure the testing, inspection and maintenance of private mains assets for compliance with the Electricity Supply (Safety and Network Management) Regulation 2008. The strategy Ausgrid has chosen to employ to ensure compliance with its regulatory obligations will be to undertake a routine program of regular inspection of privately owned mains assets on an ongoing basis. This will ensure that the owners of these assets are aware of the condition and requirements for their continued safe and reliable operation.

In the initial stages Ausgrid will be required to identify all current private poles and mains attached to the network with priority in bushfire prone areas. Ausgrid will also need to identify the shared private mains that are likely to revert to Ausgrid ownership. The current potential risk posed by the condition of private poles and mains will be assessed and assigned priorities. Once all the privately owned mains assets within Ausgrid's network have been identified, the data required will be recorded in the SAP data register and updated/corrected in Ausgrid's GIS system. To ensure that the testing, inspection and maintenance is taking place in accordance with the Electricity Supply (Safety and Network Management) Regulation 2008, an audit system will also be developed.

The majority of the pole and line inspections for Ausgrid owned assets are completed via contracted services over a five year cycle where they are offset by two and a half years. Private mains assets are to be included in these inspections via a variation to existing pole and line inspection contracts. Utilising and leveraging the existing contracts for pole and line inspections will help reduce the incremental cost to the business for this additional program of works.

The primary purpose of line inspection is to identify corrective defects that may result in a breakdown failure or present a hazard to employees, contractors, members of the general public or the environment if left unrectified. Line inspections are conducted on a periodic basis in accordance with Ausgrid's Technical Maintenance Plans.

There is no current inspection process for poles and lines that are not owned by Ausgrid (e.g. private poles, mains and common-use poles).

The pole inspection procedure to be applied to private assets will be aligned with the current network standards for pole inspections for Ausgrid assets which generally consist of:

- Above ground line visual inspection and sounding.
- Partial excavation, inspection and assessment.
- Full excavation and below ground inspection and assessment.
- Treatment and site restoration.

To ensure compliance with the requirements from the Electricity Supply (Safety and Network Management) Regulation 2008, Ausgrid is proposing that all steel or wood direct buried private poles shall be visually inspected and sounded above ground line as indicated above for wood, concrete or steel poles, and dug out as required. Steel or wood private poles considered to be in new condition (less than 5 years old), that are concreted in at ground line shall be visually inspected and sounded above ground line as indicated above for wood, concrete or steel poles. Private assets are to be inspected in the same way as if they were an Ausgrid asset with the cost of any defects to be borne and rectified by the customer.

Our Network Management Plan and other documentation including our Network Standards consider the risks involved with private mains, and stipulate that such assets are the responsibility of the owner and are required be inspected, tested and maintained. However, Ausgrid does not currently have a robust process to ensure this occurs.

The Network Standards specify the following requirements:

- An annual visual inspection must be carried out for installations in bushfire prone areas (as defined in Ausgrid's Bushfire Risk Management Plan) prior to the commencement of the bushfire danger season (as declared by the Rural Fire Service).
- A complete line inspection must be performed every five years and a complete pole inspection is required two and a half years after each complete line inspection. Any safety breaches must be attended to promptly.
- The installation of approved spreaders on bare low voltage aerial mains (in bushfire prone areas), to minimise the risk of these mains starting a bushfire.
- The maintenance of required vegetation safety clearances from private aerial mains.

Therefore Ausgrid is required to include in its Network Management Plan & Bushfire Management Plan provisions to ensure that private lines are regularly inspected, tested and maintained.

2.4.1 Asbestos Containing Materials

The strategy for the safe management of asbestos during the 2014-19 regulatory period is to introduce a comprehensive asbestos containing materials audit and inspection regime over the five year period to ensure compliance with our legislative requirements. Further detail on the proposed expenditure can be found in Section 4.2.3.

Forecast method

The purpose of this section is to provide an overview of the process Ausgrid has used to derive the total operating expenditure forecast for system maintenance. In doing so, we have taken into account the business as usual operations carried forward from the 2009-14 regulatory period and the circumstances in the 2014-19 regulatory period, as described in Section 2.

3.1 General approach

Ausgrid has developed a separate plan for system maintenance activities. The plan has largely relied on high level models rather than detailed bottom up forecasting. Our forecasting methods across the plan are based on robust assumptions. Synergies with other plans such as the area and replacement plans are considered and are accounted for at a high level. The impact of growth factors and other key variables has also been incorporated in the forecast.

A summary of our general method is set out below, with further information provided for each cost category (or sub-category where relevant).

3.2 Model approach

System maintenance operating expenditure has been forecast using a base year method or variations of the base year method. For each cost category, we assess the underlying drivers, activities, plans and strategies for the 2014-19 regulatory period and adopt a method that is appropriate to produce a forecast operating expenditure that reasonably reflects the operating expenditure criteria specified in the NER. Our total forecast operating expenditure is the sum of the forecasts of these categories. The variations to the base year method include:

- Base year method – Variation by volume.
- Base year method – Historical averaging.

The 2012-13 financial year will be used as the 'base year' and any adjustments within particular cost categories have been made to account for known changes going forward. The base year will also be adjusted for CPI going forward. The escalation due to CPI will be made in accordance with that of other plans in the Ausgrid proposal.

When the overall system maintenance expenditure outcome is examined in real dollars (Figure 3), it can be seen that despite a significant increase to the asset base shown in Table 5, and therefore the requirement to undertake more maintenance activities, maintenance expenditure overall has actually reduced during the last five years. This further demonstrates the efficiencies and savings achieved in delivering Ausgrid's maintenance programs for the 2009-14 regulatory period.

The base year is considered efficient for a number of reasons:

- When the overall system maintenance expenditure outcome for the 2009-14 regulatory period is examined in real FY14 dollars (Figure 3), it can be seen that maintenance expenditure overall has actually reduced during the last five years.
- It can be seen in Table 5 that there has been a significant increase to the asset base and ongoing network growth and therefore the requirement to undertake more maintenance activities.
- The maintenance requirements for Ausgrid's assets are developed using best practice techniques that aim to optimise programmed routine maintenance activities in order to obtain cost effective outcomes for all cost categories.
- The expenditure due to breakdown and corrective work indicate a stable maintenance regime with an appropriate balance of routine and non-routine maintenance activities.
- The expenditure in the 2012-13 financial year is six per cent below the allowance.

- The planned inspection task volumes in financial year 2012-13 are considered to be an efficient reflection of Ausgrid's requirements and continue to remain stable during the 2014-19 regulatory period.

Table 15 shows the forecasting method we intend to use for each cost category (or sub-category where relevant).

Opex groups	Cost category	Cost sub-category	Forecasting methods: Base year	Forecasting methods: Base Year Variation by Volume	Forecasting methods: Base Year Historical Averaging
System Maintenance	Inspection	Inspection - Vegetation management	√		
		Inspection – by asset group (excluding veg management)		√	
	Corrective	Corrective	√		
	Breakdown	Breakdown	√		
	Nature induced Breakdown	Nature induced Breakdown			√
	Non-Direct Maintenance	Non-Direct Maintenance	√		
	Engineering support	Engineering support	√		

Table 15 –System maintenance operating expenditure forecast methodology by cost category

The detailed forecast model calculations can be found in the Opex Forecast Model Spreadsheet which has been submitted to accompany this document and is referenced in Appendix A.

3.3 Key Assumptions

The two key assumptions that are applicable to the 2014-19 system maintenance forecast operating expenditure include:

- The financial year 2012/13 has been adopted as the efficient base year for deriving a forecast of recurrent operating expenditure.
- All forecasts are prior to the allocation of any productivity and efficiency savings related to system maintenance associated with Network Reform Programs and management initiatives to offset costs associated with the cessation of the TSA.
- Forecast annual internal labour costs and wage rate increases for the period have been set at the forecast real price escalation rate for EGW labour as provided by CEG Independent Economics.
- Forecast annual contracted services and external labour rate increases for the period have been set at the forecast real price escalation rate for general labour as provided by CEG Independent Economics.
- No real price escalation rate has been factored into materials or other costs as it is assumed that these costs will increase in line with inflation.

Further information regarding these key assumptions can be found in the Ausgrid 2014-19 regulatory proposal documentation.

3.4 Impact of capital investment

As noted previously, the cost of maintaining assets generally increases as the asset approaches the end of its life, and this is a key input into the decision to renew an asset. Consequently, where there is accelerated investment in replacement, maintenance costs would be expected to decline. Conversely, where replacement levels are reduced, maintenance costs would be expected to rise. Investment in new capacity can also have an effect, as it is often the case that the most economic means of servicing additional demand involves the replacement of older infrastructure with newer, larger capacity equipment.

This effect was considered as a particular case of the base year method with variation in volume. In this case, the method involved examining the expected change in age profile of an asset class from the base year to the end of the next period, based on planned replacement volumes. By multiplying this change by the profile of expected maintenance costs based on age, it is possible to estimate a shift in maintenance costs due to the effect of the capital program. The method is limited due to the need for reasonable quality data, however, a sensitivity analysis was undertaken to determine if the impact was likely to be material. The proposed capacity investment program is small and unlikely to have any material impact, and was disregarded.

Ausgrid has determined that it is unlikely that there would be any material change in maintenance costs over the 2014-19 period based on the current proposed levels of replacement and sensitivity analysis that was undertaken.

However, if there was a material shift in the current proposed levels of replacement, it may be necessary to further develop the approach to correctly forecast the required maintenance costs and the need for reactive replacements.

Forecast outcomes

We have forecast $1.265 billion (real FY2013-14 dollars) of operating expenditure for system maintenance during the 2014-19 regulatory period.

The purpose of this section is to provide a summary of the total system maintenance expenditure proposed for the 2014-19 regulatory period and to present the calculations and methods used to forecast the expenditure in each cost category.

4.1 Summary of Operating Expenditure

The total operating expenditure for system maintenance related expenditure is split by labour, labour hire, contracted services, materials and other in Table 16.

$K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Labour	135,451	135,392	137,917	141,413	144,331	694,504
Labour Hire	2,476	2,491	2,521	2,581	2,625	12,694
Contracted Services	70,475	74,821	77,550	79,110	81,941	383,897
Materials	17,420	17,316	17,291	17,323	17,327	86,677
Other	17,880	17,353	17,274	17,433	17,442	87,382
Total	243,702	247,372	252,553	257,860	263,666	1,265,153

Table 16 – Operating expenditure forecast breakdown (labour, labour hire, contracted services, materials & other)

This total operating expenditure is also split between Transmission and Distribution in Table 17.

Both Section 4.2.2(a) of the current Ausgrid CAM and Section 6.7.1(a) of the proposed CAM for the 2014-19 regulatory period identify that direct allocation is the appropriate basis for T & D split for system maintenance activities. The reported actual split for system maintenance in the current RIN has been using this basis. Analysis of the relative expenditure on maintaining Transmission and Distribution assets has been used to determine the split used in our forecast for the 2014-19 regulatory period which is presented in Table 17.

$K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission	14,525	14,743	15,052	15,368	15,714	75,403
Distribution	229,177	232,629	237,501	242,492	247,951	1,189,749
Total	243,702	247,372	252,553	257,860	263,666	1,265,153

Table 17 – Operating expenditure forecast breakdown (transmission and distribution)

4.2 Inspection

As detailed in Table 15, there are two methods used to forecast the operating expenditure for the following two inspection sub-categories:

- Inspection – Vegetation Management.
- Inspection
  - Transmission Mains Overhead
  - Transmission Mains Underground
  - Transmission Substations
  - Zone Substations
  - Distribution Mains
  - Distribution Substations.

The base year method with a variation based on contract renewal increases has been used to forecast the vegetation management cost sub-category.

The base year method with variation by volume has been used to forecast the operating expenditure for the remaining inspection tasks within the six main asset groups.

This method is appropriate where there is an ability to accurately predict the forecast volume of tasks and where that varies from the base year volume. For example, the required number of planned inspection tasks is driven by the number of items of equipment and the defined periodicity of inspection. The total operating expenditure needed to deliver this required volume of inspections is calculated by multiplying the task volume by the average cost per task.

The average cost per task is comprised of two elements. These are as follows:

- The 'base' average unit cost – this is the actual average cost per task we incurred during the financial year 2012-13. It is derived by dividing the total actual operating expenditure incurred for each asset group by the number of completed tasks for each asset group.
- Cost escalation – cost escalation is applied to the base average unit cost to calculate the forecast average unit cost for each year of the 2014-19 regulatory period.

The average cost per task for each asset group is then applied to the forecast volume of tasks for each asset group to derive the total inspection forecast operating expenditure for the 2014-19 period.

In the following sections, the forecast task volumes for individual maintenance activities within each asset group are presented and analysed to justify the top down variation by volume forecasting method used to derive the forecast for the inspection cost category.

The underlying principle of using a top down forecasting method relies on demonstrating that within each asset group, the total required inspection task volumes remain stable and the individual maintenance activity volumes remain a stable percentage of the total required task volumes for each asset group.

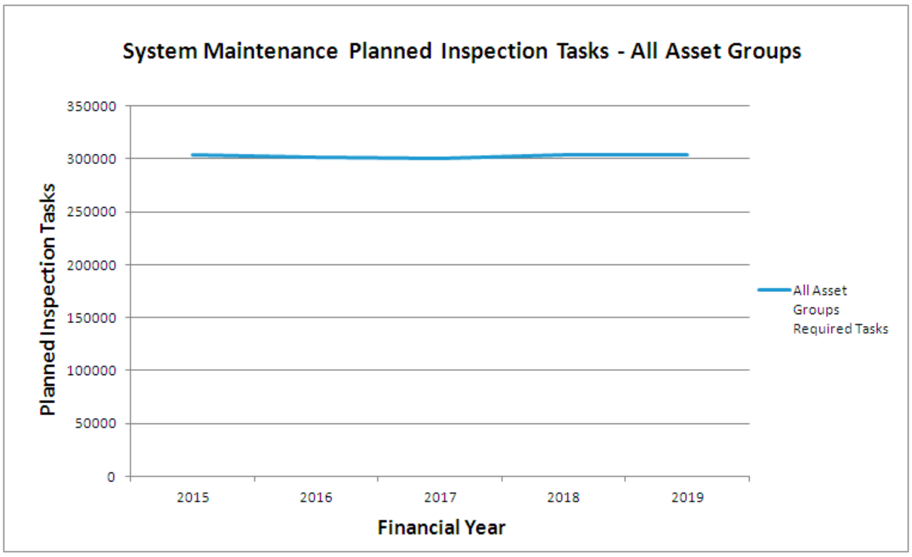

Figure 16 — System maintenance planned inspection tasks for the 2014-19 regulatory period

Overall, in most asset groups, the total required tasks and the maintenance activity volumes as a percentage of the total required task volumes remain very stable, however, where fluctuations do occur in different financial years, at a high level, the result is a very stable forecast of required task volumes for the 2014-19 regulatory period. This stable forecast of planned inspection tasks for the 2014-19 regulatory period can be observed in Figure 16. Where fluctuations do occur at the asset group level and at the individual maintenance activity level, the reasons for variations of total required task volumes include:

- Differences in the maintenance plan frequencies.
- Workload levelling and smoothing within regions to produce a maintenance program that is predictable and sustainable for all assets.
- The hierarchical nature of the maintenance activities, particularly in the substation asset groups.

Therefore, it is appropriate to use the base year method with variation by volume to forecast this particular cost category, as when the forecast of required planned inspection tasks is examined at a high level, the overall net effect of any fluctuations over a five year period is negligible.

Where variations do occur within an asset group, they are explained further in each relevant section.

The total forecast expenditure for the inspection cost category is presented in Table 18.

Inspection $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission Mains OH (Excluding Vegetation Management)	1,590	1,471	1,835	1,626	1,454	7,976
Transmission Mains UG	3,682	3,221	2,967	3,520	3,443	16,833
Transmission Substations	3,281	3,391	3,408	3,460	3,525	17,065
Zone Substations	11,710	12,081	12,004	12,235	12,616	60,646
Distribution Mains (Excluding Vegetation Management)	22,478	22,527	22,513	23,425	23,793	114,736
Distribution Substations	13,261	13,943	14,287	14,743	15,177	71,411
Private Mains	5,637	2,836	2,884	2,935	2,986	17,278
Other Assets - Asbestos Management	82	83	84	85	87	421
PM01 Inspection (Distribution Mains) – Vegetation Management	39,668	43,668	45,968	46,770	48,964	225,038
PM01 Inspection (Transmission OH Mains) – Vegetation Management	1,378	1,513	1,591	1,619	1,694	7,795
Total Required Expenditure	102,685	104,651	107,457	110,333	113,652	538,778

Table 18 – Inspection forecast expenditure 2014-19 regulatory period

4.2.1 Inspection – Vegetation Management

Based on the strategy explained in Section 2 and in Appendix A, Vegetation Management Strategy & Forecast Expenditure, the proposed expenditure for vegetation management for the 2014-19 regulatory period is presented in Table 19 split by region.

Vegetation Management $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Northern Region	8,914	10,558	10,640	10,826	10,943	51,881
South Region	6,050	7,441	7,499	7,630	7,713	36,334
East Region	3,730	4,786	4,824	4,908	4,961	23,209
Lower Hunter Region	10,262	9,595	10,619	10,804	10,922	52,201
Upper Hunter Region	2,406	2,375	3,470	3,531	3,569	15,352
Central Coast	8,479	9,117	9,188	9,348	11,193	47,325
Other (132kV Towers and Easements)	1,205	1,309	1,319	1,342	1,357	6,531
Total	8,914	10,558	10,640	10,826	10,943	51,881

Table 19 – Vegetation management forecast expenditure 2014-19 regulatory period

4.2.2 Private Mains Inspections

The inspection of private assets is based on the strategy outlined in Section 2 and consistent with the Ausgrid Policy. The following stages outline the breakdown of total estimated expenditure to implement the strategy for the 2014-19 regulatory period to ensure the testing, inspection and maintenance of private assets for compliance with the Electricity Supply (Safety and Network Management) Regulation 2008.

The proposed expenditure for private mains activities for the 2014-19 regulatory period is presented in Table 20.

Private Mains $K (FY14 real) Task Breakdown		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Stage 1: Data Capture and Validation		2,833	0	0	0	0	2,833
Stage 2: Customer Consultation and Awareness Plan		103	103	103	103	103	515
Stage 3: Develop Routine Maintenance Inspection Plan	Pole Inspection (Routine)	1,371	1,386	1,410	1,434	1,461	7,062
	Line Inspection (Routine)	283	286	292	297	302	1,460
	Line Inspection (Pre Bushfire)	707	716	729	742	756	3,650
Stage 4: Other Support Costs	Legal Services	239	243	248	253	258	1,241
	Project Management	101	102	103	105	107	518
Total		5,637	2,836	2,885	2,934	2,987	17,279

Table 20 – Cost breakdown of private mains maintenance activities for the 2014-19 regulatory period

4.2.2.1 Stage 1 – Data Capture

The first stage of the program is the identification and data capture of all current private poles and mains attached to Ausgrid's network with immediate priority in bushfire prone areas. This is a non-recurring item of expenditure.

The breakdown of costs for the proposed data capture of private poles and mains has been determined using a bottom up approach based upon the following:

- The estimated volume of private assets within our network.
- Internal unit rates for data capture.

Estimated Number of Private Poles	Data Capture Expenditure $K (Real)
93,345	2,833

Table 21 – Estimated volumes and data capture costs of private mains assets

Further detail on this bottom up approach is contained within the forecast model.

4.2.2.2 Stage 2 – Customer Consultation and Awareness Plan

The second stage of the program is the development and implementation of an ongoing customer consultation and awareness plan to manage stakeholder expectations once the change in policy occurs. These costs are in addition to the previous expenditure allowed for the existing annual bushfire awareness campaigns which will still continue as a separate program.

The breakdown of costs in Table 22 for the proposed customer consultation and awareness plan has been determined using a bottom up approach based upon the following:

- Advertising costs on an annual basis
- Brochure costs on an annual basis

Category	Expenditure $K (Real)
Advertising Costs	311.5
Brochure Costs	203.5
Total Costs	515

Table 22 – Estimated customer consultation and awareness plan costs

Further detail on this bottom up approach is contained within the forecast model.

4.2.2.3 Stage 3 – Routine Maintenance Inspection Plan

The third stage of the program is the implementation of routine pole and line inspections for private poles and lines that aligns with the same inspection task package and inspection frequency as the Ausgrid pole and line inspection tasks. The proposed program also includes the pre bush fire line inspections for those private assets located in bush fire areas.

The volume of the number of private poles within the network has been calculated to be 93,345 from the data extracted from our GIS system. The number of private mains to be inspected has been determined by the following method: 75% of private poles (70,105) have been identified as 'A' Poles and therefore the lines are already accounted for within Ausgrid's routine line inspection i.e. a single span of service mains to 'A' poles. Thus 25% (23,340) of private mains are not currently covered by Ausgrid's routine line inspections. These private mains extend beyond the 'A' pole for a number of spans before reaching the property or connection point. The number of line inspections required has been calculated with a 1:1 ratio to the number of poles not currently covered by Ausgrid's routine line inspections. The volumes to be inspected on an annual basis are summarised in Table 23.

Estimated Number of Private Poles	Annual Pole Inspections	Estimated Number of Private Lines	Annual Line Inspections
93,345	18,669	23,336	4,667

Table 23 – Estimated volumes of private mains assets to be inspected

Further detail on this bottom up approach is contained within the forecast model.

4.2.2.4 Stage 4 – Other Support Costs

The fourth stage of the program includes the ongoing project management and legal services that will be required to support the maintenance program.

The breakdown of project management and legal costs in Table 24 has been determined using a bottom up approach based upon the following:

- Project Management costs on an annual basis.
- Legal costs on an annual basis.

Category	Expenditure $M (Real)
Legal Costs	1,241
Project Management Costs	518
Total Costs	1,758

Table 24 – Estimated project management and legal costs

Further detail on this bottom up approach is contained within the forecast model.

4.2.3 Asbestos Containing Materials Asset Maintenance Inspections

4.2.3.1 Asset Inspection Requirements

Ausgrid has identified all assets across a number of asset categories which may be suspected of containing asbestos-containing materials on the basis of both the age of the asset and the electrical equipment within those assets. Ausgrid's strategy includes the comprehensive inspection of all assets and development and review of asbestos registers for all commissioned substations constructed prior to 2000. A comprehensive audit program is a mandatory strict requirement in accordance with legislative requirements where previous ad-hoc and reactive inspection regimes may be considered non-compliant.

Table 25 below provides details of the number of assets which are required to be inspected in accordance with the requirements of legislation and a description of the nature of these assets.

Asset Class	Description	Size	Asset population (approx)	Special access requirements
Zone Substation or Transmission Substation	Large substations Sites generally comprising a substation building housing electrical equipment along with an outdoor switchyard area. Includes multi-storey indoor substation structures particularly in the Sydney CBD and inner-urban areas. Operating voltage 132kV /66kV/33kV to 11kV	~3000m2 – 25,000m2	207	Basements of zone substations may be classified as a confined space.
Underground Substation (Distribution)	Small substations located underground in footways or pedestrian walkways. Generally these substations consist of 1 – 2 chambers housing all electrical equipment. Underground substations are distribution level substations operation at 11kV to 415V.	~60m2	500	Underground substations may be classified as a confined space. Underground substations may require fall arrest equipment for access due to vertical ladder entries. A road occupancy licence may be required to access this type of asset.
Surface Building Substation (Distribution)	Surface building substations generally consist of a brick or block work building structure housing electrical equipment. These substations may also have a small external switchyard area also housing electrical equipment. Surface Building substations are distribution level substations operation at 11kV to 415V.	60m2 – 200m2	1680	
Kiosk Substation (Distribution)	Kiosk type substations consist of a housing structure that encloses electrical equipment. Kiosk substations are located on footways and easement areas.	~10m2	7400	ACM presumed based upon characteristic audits of kiosk models.
Other Assets	Miscellaneous supporting assets containing Asbestos-containing materials		~55	

Table 25 – Substation Inspection Requirements

4.2.3.2 Asbestos Maintenance Plan Inspections

In accordance with the requirements of legislation, Ausgrid's Asbestos Safety Management Plan (ASMP) requires the inspection of assets suspected of containing asbestos-materials on at least a five yearly basis.

Maintenance inspections across all asset categories will be smoothed over the five year regulatory period with the annual allocation of individual assets for inspection prioritised on the basis of any prior ad-hoc inspection date as well as on the basis of the risk assessment of potential asbestos exposure for the particular asset class. This program shall ensure that all assets are inspected within the regulated five year inspection period.

The number of required inspections is presented in Table 26.

Maintenance Inspections Units	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Zone Substations	33	34	33	33	33	166
Transmission Substations	9	8	8	8	8	41
Underground Substation (Distribution)	100	100	100	100	100	500
Surface Building Substation (Distribution)	336	336	336	336	336	1680
Kiosk Substation	20	20	20	20	20	100
Other Assets	11	11	11	11	11	55

Table 26 – ACM maintenance inspection plan according to asset category

4.2.3.3 Inspection Resource Requirements

All inspections are required by legislation to be conducted by competent persons. The competent person must have training, a qualification or experience.

The competent person may:

- be trained to handle and take asbestos or ACM samples
- have the knowledge and experience to identify suspected asbestos or ACM
- determine risk and control measures
- be familiar with building and construction practices to determine where asbestos or ACM is likely to be present
- be able to determine that material is friable or non-friable and evaluate its condition.

Persons considered competent include:

- Occupational hygienists who have experience in asbestos or ACM
- licensed asbestos or ACM assessors
- licensed asbestos or ACM removal supervisors
- individuals who have a statement of attainment in the unit competency for asbestos or ACM assessors

- a person working for an organisation accredited by NATA under AS17020:2000.

Reactive and ad-hoc inspections previously conducted by Ausgrid staff may not be considered to have rigorously satisfied the requirements of a competent person in accordance with legislation.

Ausgrid shall ensure that competent persons undertake inspection of asbestos-containing materials through the engagement of specialist contracted services in accordance with the requirements outlined. These services are contracted through a competitive tendering process in accordance with the organisations procurement policies and guidelines.

In addition to the requirement for competent persons to undertake the inspections, access to Ausgrid facilities also requires authorised persons to accompany persons undertaking inspections in accordance with the requirements of Ausgrid's Electrical Safety Rules.

In some circumstances additional resources may be required to safely access sites due to the location of assets within roadways or in underground locations. These locations may require additional resources such as traffic control or specialised equipment for safe access.

4.2.3.4 Inspection Forecast Model

Forecast of expenditure required to complete inspection maintenance tasks are based upon the following inputs:

- physical size of the site to be inspected and the required time to undertake a comprehensive inspection
- nature of the site including special access requirements such as height access
- market tested rates for the provision of specialised contracted resources to conduct inspections
- requirements for provision of safe electrical access to sites by Ausgrid personnel.

The proposed expenditure for ACM inspection activities for the 2014-19 regulatory period is presented in Table 27.

Maintenance Inspections $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission Substations	89	90	91	93	95	457
Zone Substations	359	363	369	376	383	1,849
Distribution Substations	961	972	989	1,007	1,026	4,956
Other Assets	82	83	84	86	87	421
Total	1,489	1,507	1,534	1,562	1,591	7,682

Table 27 – Cost breakdown of ACM maintenance activities for the 2014-19 regulatory period

4.2.4 Inspection – Transmission Mains Overhead

The total expenditure incurred in the inspection cost category for Transmission Mains Overhead (TMOH) for the 2012-13 financial year is shown in Table 28. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - TMOH	Inspection
Expenditure 2012-13 (FY14 Real $K)	1,613
Completed Tasks	13,656
Average Cost Per Task 2012-13 (FY14 Real $)	118

Table 28 – Average cost per task in 2012-13 financial year -TMOH

There are five inspection maintenance plan activities undertaken on a routine basis for all TMOH assets. These maintenance plan activities are listed below in Table 29. Further information on the actual tasks undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 17.

Whilst each of the maintenance plan activities in Table 29 incurs a specific cost per task, it can be seen in Figure 18 and Figure 19 that the task volumes for each maintenance activity type as a percentage of the total required volume of tasks for this asset group remain fairly stable over the 2014-19 regulatory period. The variations year to year for the different activities within this asset group can be attributed to the differences in the maintenance plan frequencies and the workload levelling and smoothing within regions.

Maintenance Plan Activity	Abbreviated Activity
Bushfire Patrol	MNT-PLAN-BUSH
Diagnostic Check	MNT-PLAN-DIAG
Inspection	MNT-PLAN-INSP
Routine Line Inspections	MNT-PLAN-LINS
Routine Pole and tower Inspections	MNT-PLAN-PINS/TINS (TMOH Support Structures)

Table 29 – Maintenance activity - TMOH

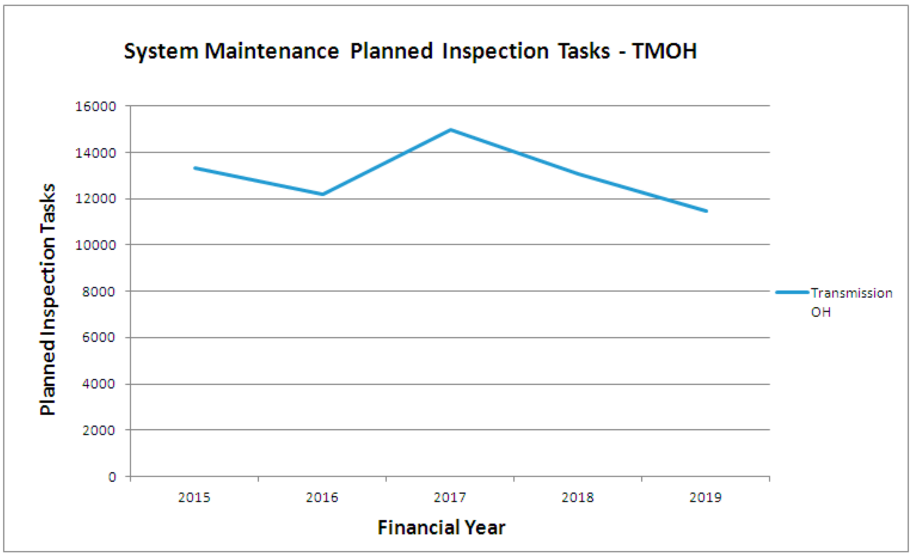

Figure 17 — Forecast planned inspection tasks – TMOH

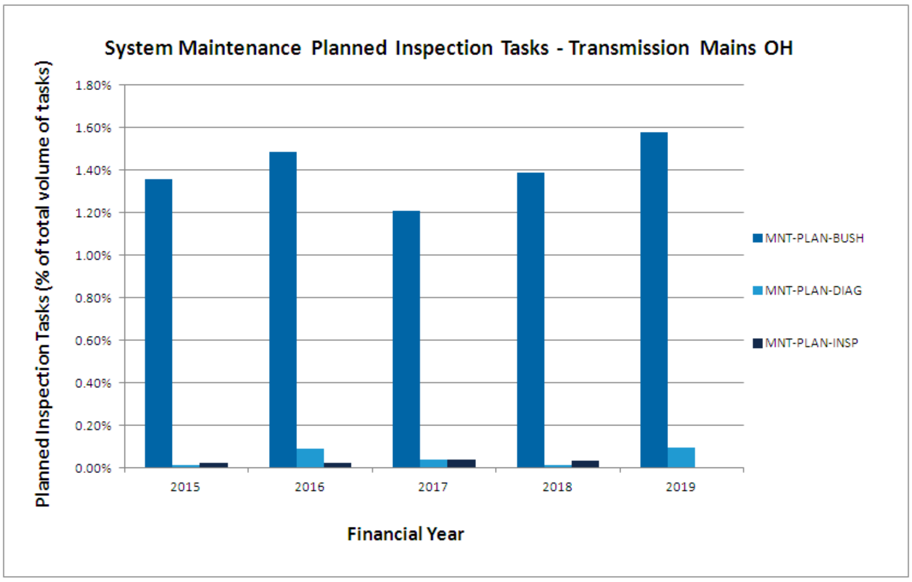

Figure 18 — Forecast planned inspection Tasks (bush, diag & insp) – TMOH

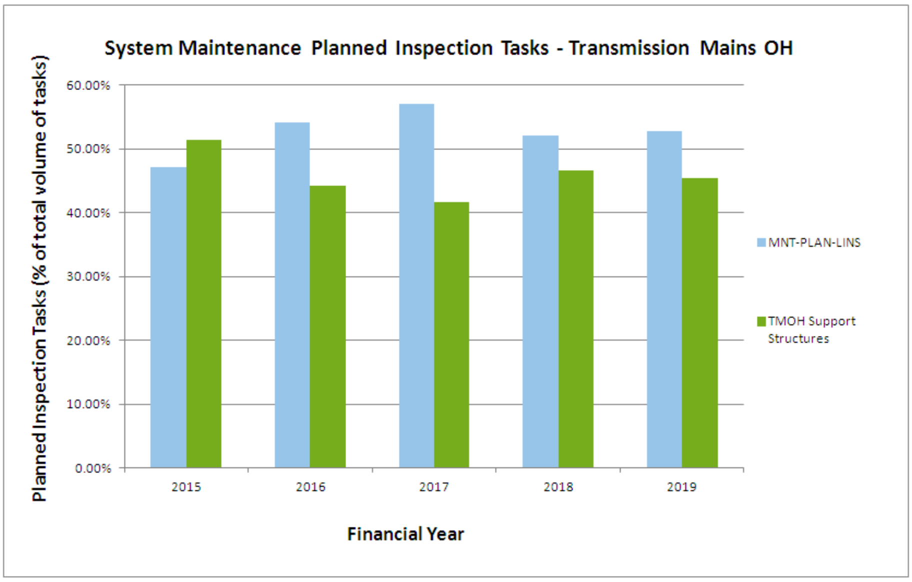

Figure 19 — Forecast planned inspection tasks (lins & support structures) – TMOH

The required operating expenditure for the TMOH asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 30.

Asset Group - TMOH	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	13339	12191	14971	13053	11485	65039
Average Cost Per Task (FY14 Real $)	119	121	123	125	127	
Total Required Expenditure (FY14 Real $K)	1,590	1,471	1,835	1,626	1,454	7,977

Table 30 – TMOH planned inspection forecast expenditure 2014-19 regulatory period

4.2.5 Inspection – Transmission Mains Underground

The total expenditure incurred in the inspection cost category for Transmission Mains Underground (TMUG) for the 2012-13 financial year is shown in Table 31. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - TMUG	Inspection
Expenditure 2012-13 (FY14 Real $K)	2,836
Completed Tasks	722
Average Cost Per Task 2012-13 (FY14 Real $)	3,928

Table 31 – Average cost per task in 2012-13 financial year -TMUG

There are six inspection maintenance plan activities undertaken on a routine basis for all TMUG assets. These maintenance plan activities are listed below in Table 32. Further information on the actual tasks

undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 20.

Whilst each of the maintenance plan activities in Table 32 incurs a specific cost per task, it can be seen in Figure 21 that the task volumes for each maintenance activity as a percentage of the total required volume of tasks for this asset group remain fairly stable over the 2014-19 regulatory period. The variations year to year for the different activities within this asset group can be attributed to the differences in the maintenance plan frequencies and the workload levelling and smoothing within regions.

Maintenance Plan Activity	Abbreviated Activity
Diagnostic Check	MNT-PLAN-DIAG
Inspection	MNT-PLAN-INSP
Intrusive	MNT-PLAN-INTR
Performance Check	MNT-PLAN-PERF
Portable Earth Inspection & Testing	MNT-PLAN-PETS
Pit/UG Link Box Lid Inspections	MNT-PLAN-PITL

Table 32 –Maintenance activity - TMUG

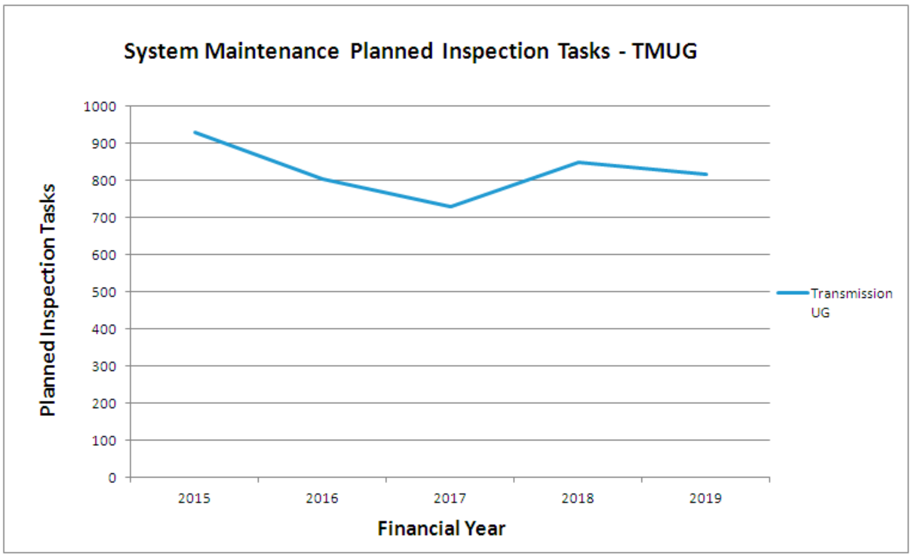

Figure 20 – Forecast planned inspection tasks – TMUG

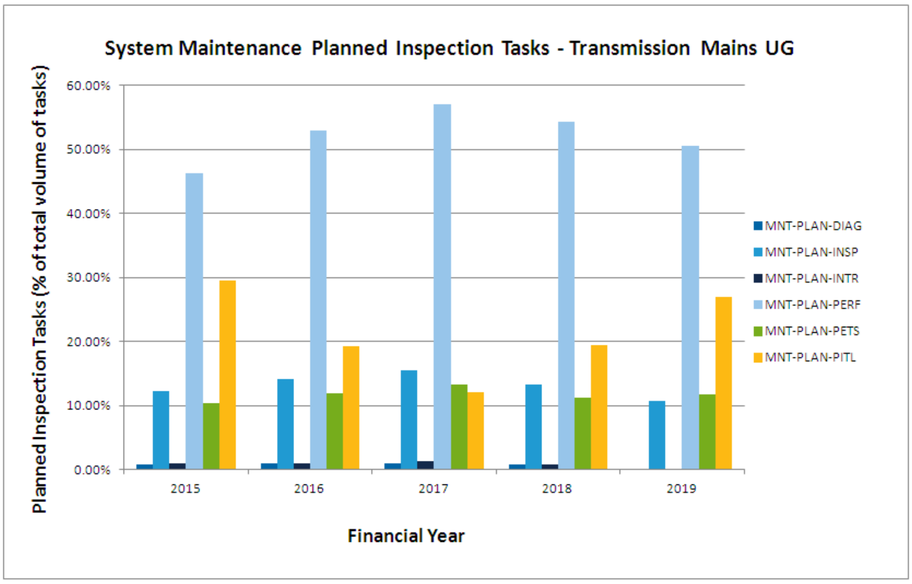

Figure 21 — Forecast planned inspection tasks (diag, insp, intr, perf, pets & pitl) – TMUG

The required operating expenditure for the TMUG asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 33.

Asset Group - TMUG	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	929	803	728	850	818	4128
Average Cost Per Task (FY14 Real $)	3,964	4,011	4,076	4,141	4,209	
Total Required Expenditure (FY14 Real $K)	3,682	3,221	2,967	3,520	3,443	16,833

Table 33 – TMUG planned inspection forecast expenditure 2014-19 regulatory period

4.2.6 Inspection – Transmission Substations

The total expenditure incurred in the inspection cost category for Transmission Substations (TS) for the 2012-13 financial year is shown in Table 34. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - TS	Inspection
Expenditure 2012-13 (FY14 Real $K)	2,858
Completed Tasks	7,852
Average Cost Per Task 2012-13 (FY14 Real $)	364

Table 34 – Average cost per task in 2012-13 financial year -TS

There are eight inspection maintenance plan activities undertaken on a routine basis for all TS assets. These maintenance plan activities are listed below in Table 35. Further information on the actual tasks

undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 22.

Whilst each of the maintenance plan activities in Table 35 incurs a specific cost per task, it can be seen in Figure 23 and Figure 24 that the task volumes for each maintenance activity as a percentage of the total required volume of tasks for this asset group remain very stable over the 2014-19 regulatory period.

Maintenance Plan Activity	Abbreviated Activity
Diagnostic Check	MNT-PLAN-DIAG
Fire Systems Inspection & Testing	MNT-PLAN-FIRE
Functional Check	MNT-PLAN-FUNC
Inspection	MNT-PLAN-INSP
Intrusive	MNT-PLAN-INTR
Measurement Reading	MNT-PLAN-MSRE
Portable Earth Inspection & Testing	MNT-PLAN-PETS
Routine Pole Inspections	MNT-PLAN-PINS

Table 35 – Maintenance activity - TS

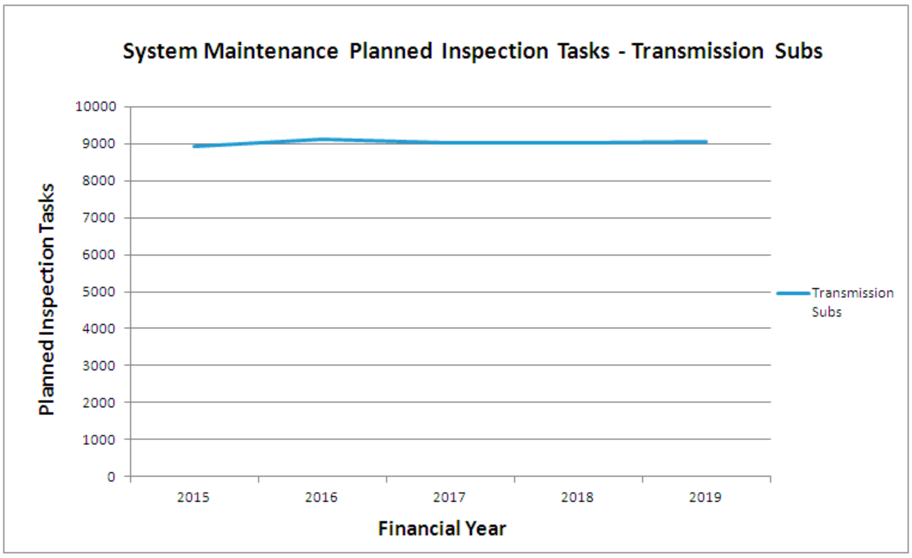

Figure 22 — Forecast planned inspection tasks – TS

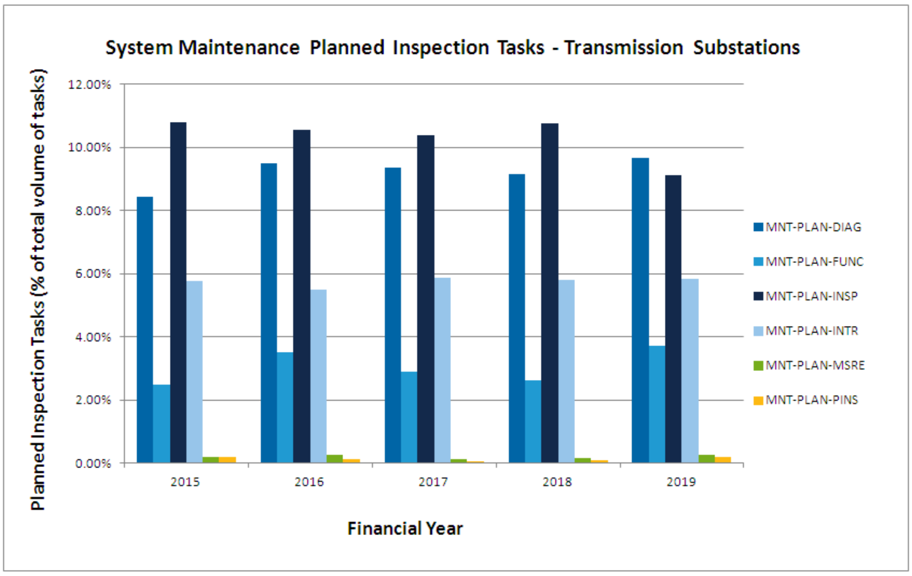

Figure 23 — Forecast planned inspection tasks (diag, func, insp, intr, msre & pins) – TS

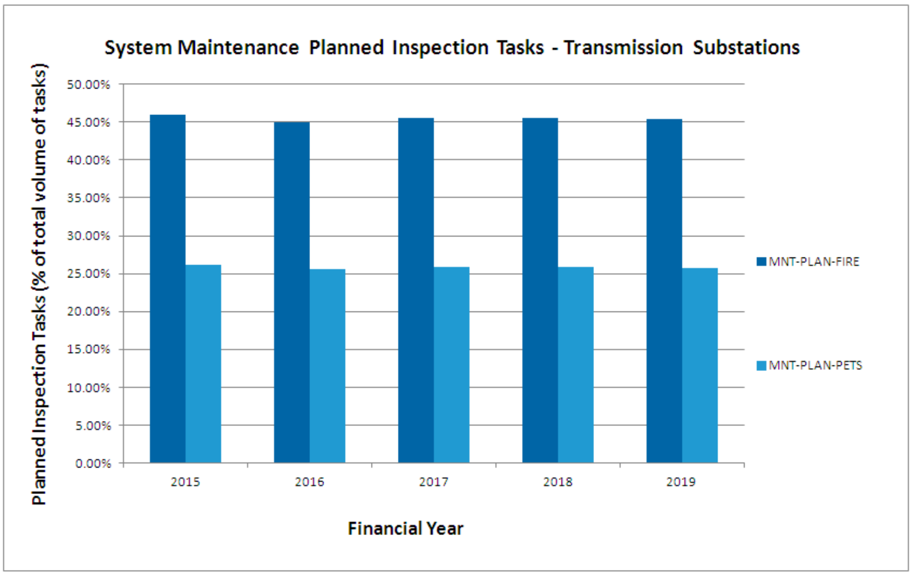

Figure 24 — Forecast planned inspection tasks (fire & pets) – TS

The required operating expenditure for the TS asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 36.

Asset Group - TS	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	8933	9125	9025	9016	9038	45137
Average Cost Per Task (FY14 Real $)	367	372	378	384	390	
Total Required Expenditure (FY14 Real $K)	3,281	3,391	3,408	3,460	3,525	17,065

Table 36 – TS planned inspection forecast expenditure 2014-19 regulatory period

4.2.7 Inspection – Zone Substations

The total expenditure incurred in the inspection cost category for Zone Substations (ZN) for the 2012-13 financial year is shown in Table 37. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - ZN	Inspection
Expenditure 2012-13 (FY14 Real $K)	10,690
Completed Tasks	34,013
Average Cost Per Task 2012-13 (FY14 Real $)	314

Table 37 – Average cost per task in 2012-13 financial year - ZN

There are nine inspection maintenance plan activities undertaken on a routine basis for all ZN assets. These maintenance plan activities are listed below in Table 38. Further information on the actual tasks undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 25.

Whilst each of the maintenance plan activities in Table 38 incurs a specific cost per task, it can be seen in Figure 26 and Figure 27 that the task volumes for each maintenance activity as a percentage of the total required volume of tasks for this asset group remain very stable over the 2014-19 regulatory period. The small variations year to year for the different activities can be attributed to the hierarchal nature of the substation tasks.

Maintenance Plan Activity	Abbreviated Activity
Diagnostic Check	MNT-PLAN-DIAG
Fire Systems Inspection & Testing	MNT-PLAN-FIRE
Functional Check	MNT-PLAN-FUNC
Inspection	MNT-PLAN-INSP
Intrusive	MNT-PLAN-INTR
Measurement Reading	MNT-PLAN-MSRE
Portable Earth Inspection & Testing	MNT-PLAN-PETS
Routine Pole Inspections	MNT-PLAN-PINS
Insulated Stick Inspection & Testing	MNT-PLAN-STCK

Table 38 – Maintenance activity - ZN

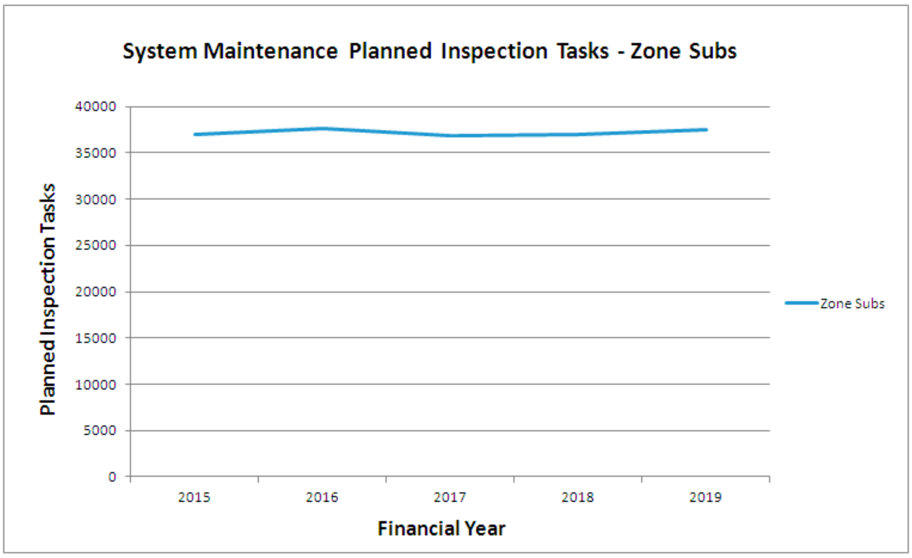

Figure 25 — Forecast planned inspection tasks – ZN

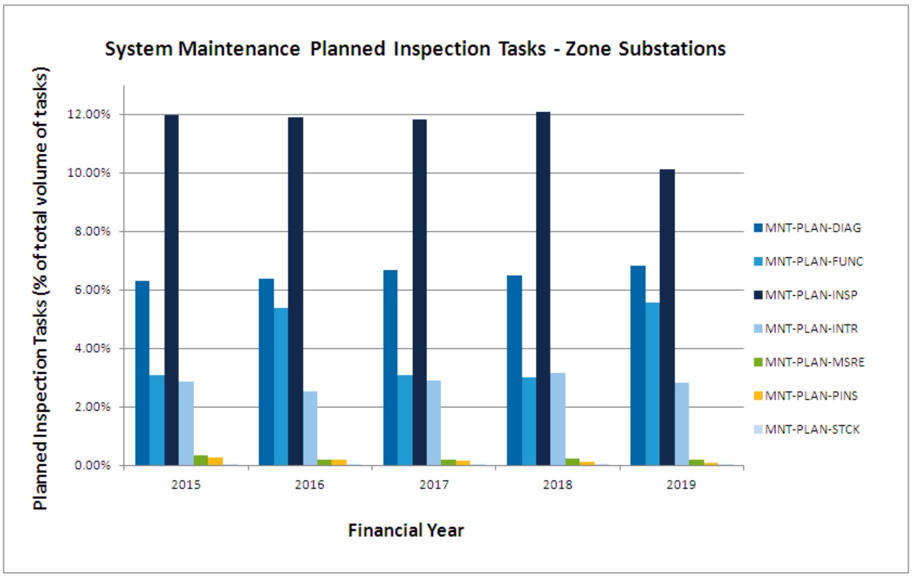

Figure 26 — Forecast planned inspection tasks (diag, func, insp, intr, msre, pins & stck) – ZN

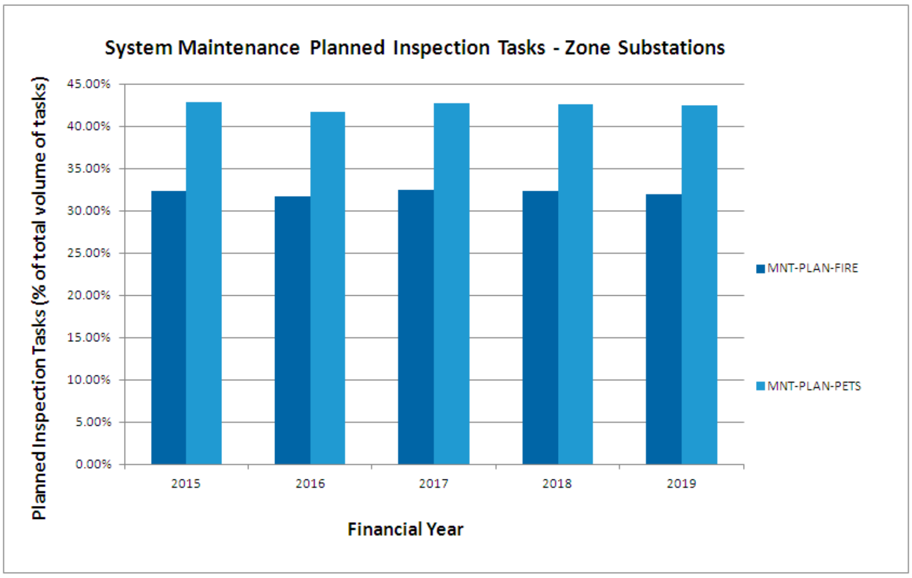

Figure 27 — Forecast planned inspection tasks (fire & pets) – ZN

The required operating expenditure for the ZN asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 39.

Asset Group - ZN	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	36921	37641	36810	36919	37463	185754
Average Cost Per Task (FY14 Real $)	317	321	326	331	337	
Total Required Expenditure (FY14 Real $K)	11,710	12,081	12,004	12,235	12,616	60,646

Table 39 – ZN planned inspection forecast expenditure 2014-19 regulatory period

4.2.8 Inspection – Distribution Mains

The total expenditure incurred in the inspection cost category for Distribution Mains (DM) (excluding vegetation management) for the 2012-13 financial year is shown in Table 40. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - DM	Inspection
Expenditure 2012-13 (FY14 Real $K)	21,741
Completed Tasks	211,639
Average Cost Per Task 2012-13 (FY14 Real $)	103

Table 40 – Average cost per task in 2012-13 financial year - DM

There are nine inspection maintenance plan activities undertaken on a routine basis for all DM assets. These maintenance plan activities are listed below in Table 41. Further information on the actual tasks undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 28.

Whilst each of the maintenance plan activities in Table 41 incurs a specific cost per task, it can be seen in Figure 29 and Figure 30 that the task volumes for each maintenance activity as a percentage of the total required volume of tasks for this asset group remain fairly stable over the 2014-19 regulatory period. The small variations year to year for the different activities can be attributed to the differences in the maintenance plan frequencies and the workload levelling and smoothing within regions.

Maintenance Plan Activity	Abbreviated Activity
Diagnostic Check	MNT-PLAN-DIAG
Inspection	MNT-PLAN-INSP
Intrusive	MNT-PLAN-INTR
Routine Line Inspections	MNT-PLAN-LINS
Portable Earth Inspection & Testing	MNT-PLAN-PETS
Pillar Inspections	MNT-PLAN-PILR
Routine Pole Inspections	MNT-PLAN-PINS
Pit/UG Link Box Lid Inspections	MNT-PLAN-PITL
Thermovision Inspections	MNT-PLAN-THRM

Table 41 – Maintenance activity - DM

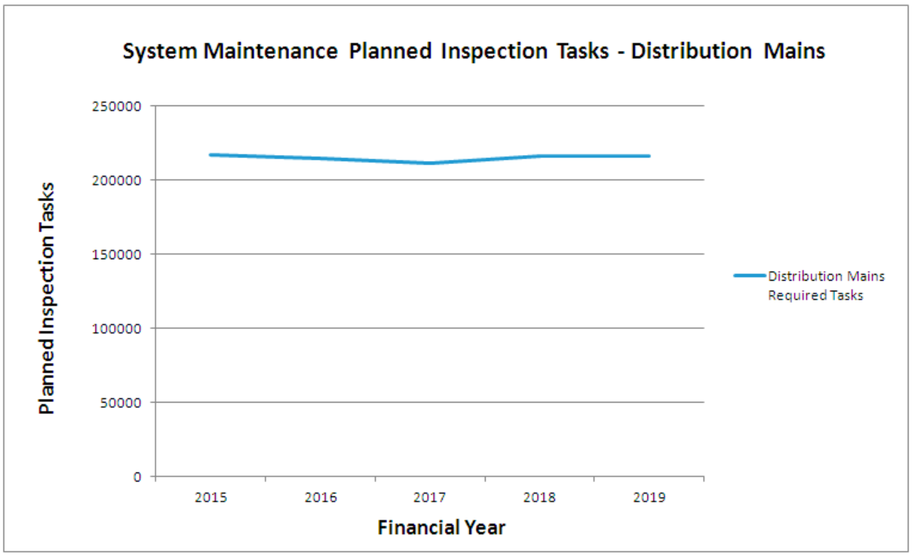

Figure 28 — Forecast planned inspection tasks – DM

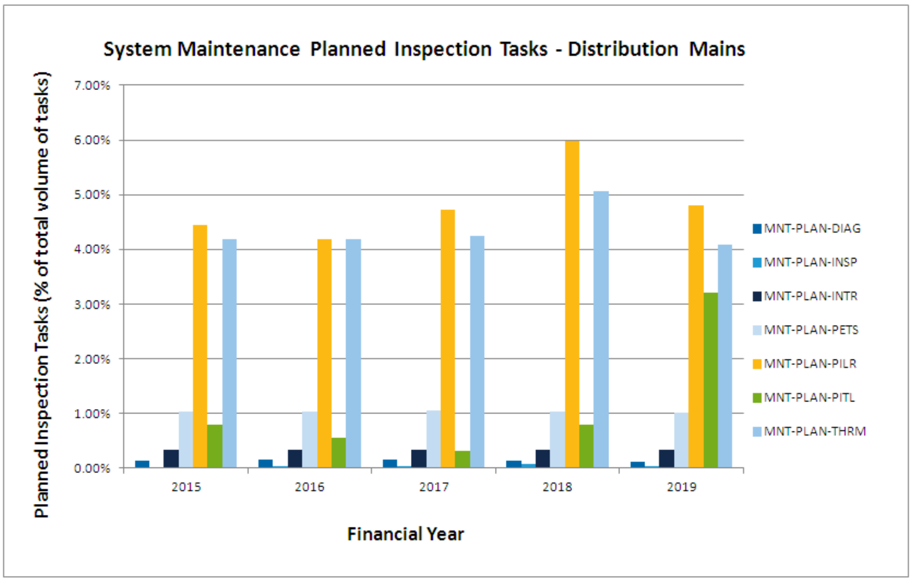

Figure 29 — Forecast planned inspection tasks (diag, insp, intr, pets, pilr, pitl & thrm) – DM

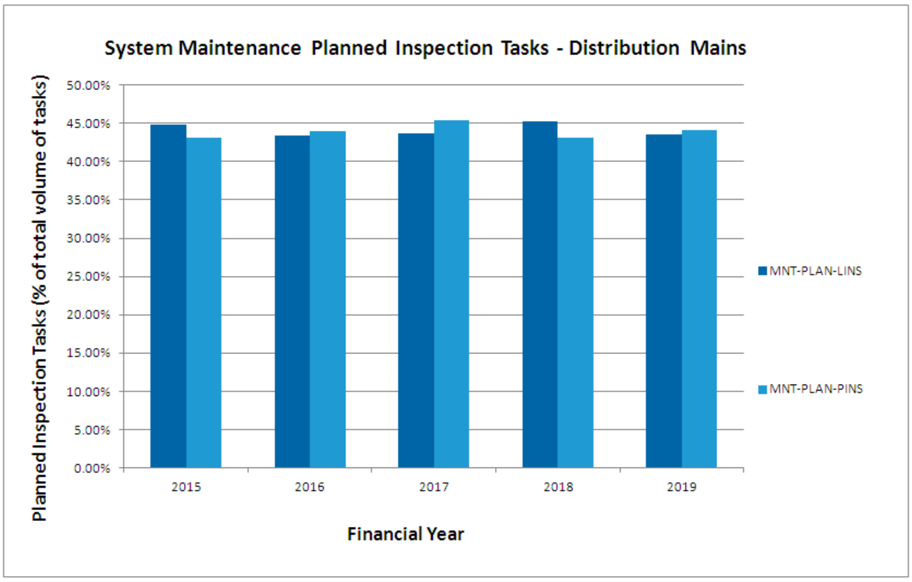

Figure 30 — Forecast planned inspection tasks (lins & pins) – DM

The required operating expenditure for the DM asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 42.

Asset Group - DM	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	216,827	214,746	211,211	216,264	216,157	1,075,205
Average Cost Per Task (FY14 Real $)	104	105	107	108	110	
Total Required Expenditure (FY14 Real $K)	22,478	22,527	22,513	23,425	23,793	114,735

Table 42 – DM planned inspection forecast expenditure 2014-19 regulatory period

4.2.9 Inspection – Distribution Substations

The total expenditure incurred in the inspection cost category for Distribution Substations (DC) for the 2012-13 financial year is shown in Table 43. This total expenditure and the total number of completed tasks have been used to derive an average cost per task.

Asset Group - DC	Inspection
Expenditure 2012-13 (FY14 Real $K)	12,010
Completed Tasks	24,093
Average Cost Per Task 2012-13 (FY14 Real $)	499

Table 43 – Average cost per task in 2012-13 financial year - DC

There are six inspection maintenance plan activities undertaken on a routine basis for all DC assets. These maintenance plan activities are listed below in Table 44. Further information on the actual tasks

undertaken and the frequency and latitude of each maintenance activity can be found within the Ausgrid Technical Maintenance Plans.

The forecast volume of planned inspection tasks for this asset group during the 2014-19 regulatory period is shown in Figure 31.

Whilst each of the maintenance plan activities in Table 44 incurs a specific cost per task, it can be seen in Figure 32 that the task volumes for each maintenance activity as a percentage of the total required volume of tasks for this asset group remain very stable over the 2014-19 regulatory period.

Maintenance Plan Activity	Abbreviated Activity
Diagnostic Check	MNT-PLAN-DIAG
Fire Systems Inspection & Testing	MNT-PLAN-FIRE
Functional Check	MNT-PLAN-FUNC
Inspection	MNT-PLAN-INSP
Intrusive	MNT-PLAN-INTR
Portable Earth Inspection & Testing	MNT-PLAN-PETS

Table 44 – Maintenance activity - DC

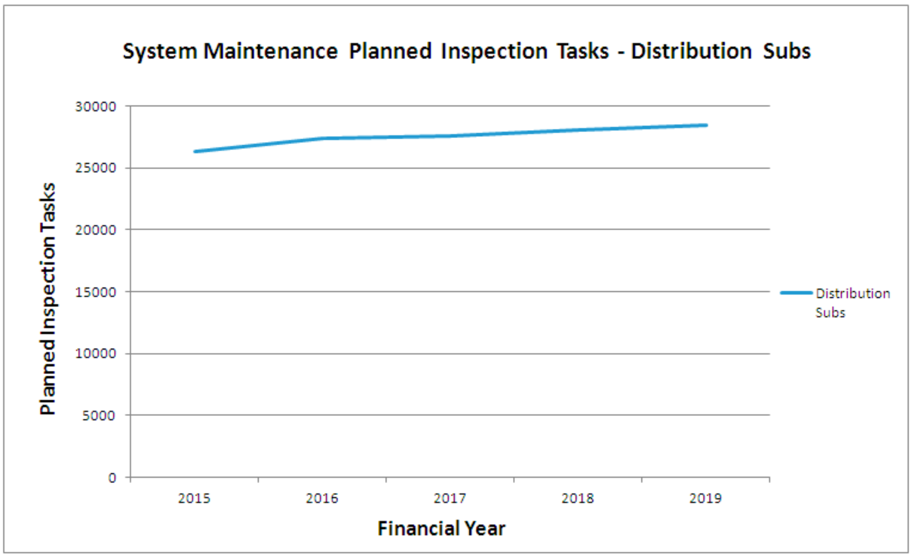

Figure 31 — Forecast planned inspection tasks – DC

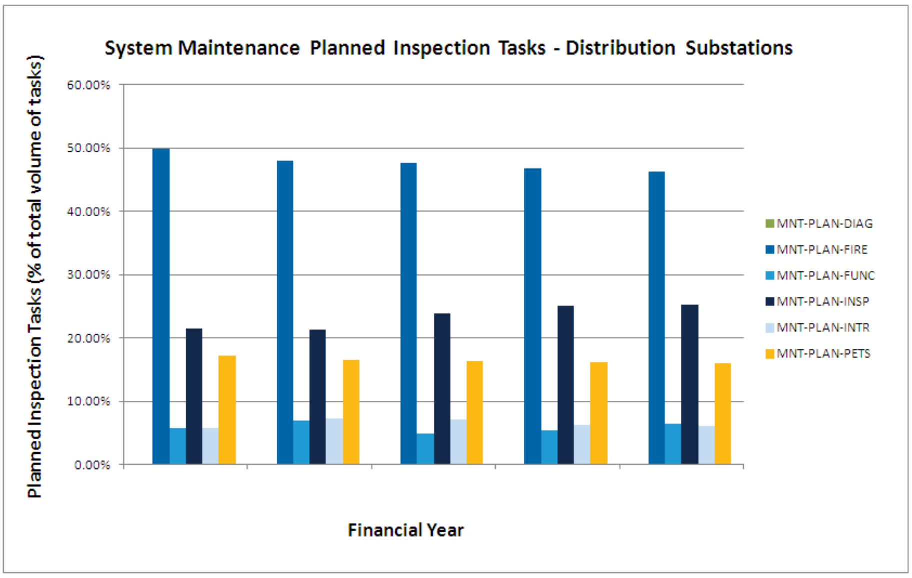

Figure 32 — Forecast planned inspection tasks (diag, fire, func, insp, intr & pets) – DC

The required operating expenditure for the DC asset group planned inspection tasks for the 2014-19 regulatory period is presented in Table 45.

Asset Group – DC	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Required Tasks	26,361	27,391	27,622	28,049	28,414	137,837
Average Cost Per Task (FY14 Real $)	503	509	517	526	534	
Total Required Expenditure (FY14 Real $K)	13,261	13,943	14,287	14,743	15,177	71,411

Table 45 – DC planned inspection forecast expenditure 2014-19 regulatory period

4.3 Corrective

The base year method has been used to forecast the operating expenditure for the corrective cost category.

The base year method involves the selection of a starting actual operating expenditure amount or base which is then escalated and adjusted as appropriate to derive a forecast that best reflects the operating expenditure requirements of the forthcoming 2014-19 regulatory period.

The base amount used to forecast the corrective operating expenditure is the actual operating expenditure outcomes for the financial year 2012-13. This method is appropriate to forecast the required expenditure, based on the following:

- When the corrective maintenance expenditure outcome for the 2009-14 regulatory period is examined in real FY14 dollars, it can be seen that corrective maintenance expenditure overall has actually reduced during the last five years.
- The expenditure for the financial year 2012-13 is below the average expenditure seen during the 2009-14 regulatory period.
- Unpredictable nature of non-routine maintenance activities.
- The significant differences in the scope and cost of individual non-routine or corrective maintenance tasks.

- Whilst Ausgrid continue to undertake routine maintenance activities and the forward forecasting process is based on stable volumes of planned inspection tasks, the assumption has been made that non-routine or corrective activities will be identified and addressed at much the same rate as what was experienced during the current 2009-14 regulatory period.

Whilst other forecasting methods were considered for the corrective cost category, the base year method was considered the most appropriate forecasting method to forecast operational expenditure for the 2014-19 regulatory period.

The forecast expenditure for the corrective cost category is presented in Table 46.

Corrective $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission Mains OH	3,931	3,977	4,041	4,107	4,174	20,229
Transmission Mains UG	5,006	5,064	5,145	5,229	5,315	25,759
Transmission Substations	2,160	2,185	2,220	2,256	2,293	11,115
Zone Substations	9,988	10,105	10,267	10,434	10,605	51,400
Distribution Mains	22,519	22,781	23,148	23,525	23,910	115,884
Distribution Substations	11,436	11,569	11,756	11,947	12,143	58,851
Total Required Expenditure	55,040	55,681	56,577	57,498	58,440	283,237

Table 46 – Corrective forecast expenditure 2014-19 regulatory period

4.4 Breakdown

The base year method has been used to forecast the operating expenditure for the breakdown cost category.

The base year method involves the selection of a starting actual operating expenditure amount or base which is then escalated and adjusted as appropriate to derive a forecast that best reflects the operating expenditure requirements of the forthcoming 2014-19 regulatory period.

The base amount used to forecast the breakdown operating expenditure is the actual operating expenditure outcomes for the financial year 2012-13. This method is appropriate to forecast the required expenditure, based on the following:

- When the breakdown maintenance expenditure outcome for the 2009-14 regulatory period is examined in real FY14 dollars, it can be seen that breakdown maintenance expenditure overall has remained fairly stable during the last five years.
- Unpredictable nature of emergency response maintenance activities.
- The significant differences in the scope and cost of individual emergency response maintenance tasks.
- Whilst Ausgrid continue to undertake routine maintenance activities and the forward forecasting process is based on stable volumes of planned inspection tasks, the assumption has been made that emergency response activities will be identified and addressed at much the same rate as what was experienced during the current 2009-14 regulatory period.

Whilst other forecasting methods were considered for the breakdown cost category, the base year method was considered the most appropriate forecasting method to forecast operational expenditure for the 2014-19 regulatory period.

The forecast expenditure for the breakdown cost category is presented in Table 47.

Breakdown $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission Mains OH	1,059	1,072	1,088	1,105	1,122	5,446
Transmission Mains UG	4,332	4,382	4,449	4,519	4,589	22,271
Transmission Substations	1,540	1,558	1,582	1,607	1,632	7,919
Zone Substations	4,925	4,981	5,058	5,137	5,217	25,318
Distribution Mains	37,514	37,941	38,527	39,126	39,736	192,844
Distribution Substations	4,966	5,022	5,100	5,179	5,260	25,526
Total Required Expenditure	54,336	54,955	55,804	56,672	57,556	279,323

Table 47 –Breakdown forecast expenditure 2014-19 regulatory period

4.5 Nature Induced Breakdown

The base year method adjusted by historical averaging has been used to forecast the operating expenditure for the nature induced breakdown cost category.

This method is appropriate due to the significant variation in year to year expenditure of this cost category, which means that the base year is not representative of the likely future. This involves taking a historical average of the costs captured during the first four years of the current 2009-14 regulatory period and substituting the average for the base year actual operating expenditure.

This method is appropriate to forecast the required expenditure, based on the following:

- When the nature induced breakdown maintenance expenditure outcome for the 2009-14 regulatory period is examined in real FY14 dollars, it can be seen that the maintenance expenditure overall for this cost category has been variable during the last five years.
- Unpredictable nature of emergency response maintenance activities especially those that are driven by external events outside of our control.
- The significant differences in the scope and cost of individual emergency response maintenance tasks.

The forecast expenditure for the nature induced breakdown cost category is presented in Table 48.

Nature Induced Breakdown $K (FY14 real)	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Transmission Mains OH	371	376	382	388	394	1,911
Transmission Mains UG	3	3	3	3	3	13
Transmission Substations	63	64	65	66	67	325
Zone Substations	189	192	195	198	201	976
Distribution Mains	7,528	7,621	7,746	7,874	8,004	38,773
Distribution Substations	432	437	445	452	459	2,226
Total Required Expenditure	8,586	8,692	8,835	8,981	9,129	44,223

Table 48 – Nature induced breakdown forecast expenditure 2014-19 regulatory period

4.6 Non-Direct Maintenance and Engineering Support

The base year method has been used to forecast the operating expenditure for the non-direct maintenance and engineering support cost categories.

The base year method involves the selection of a starting actual operating expenditure amount or base which is then escalated and adjusted as appropriate to derive a forecast that best reflects the operating expenditure requirements of the forthcoming 2014-19 regulatory period.

The base amount used to forecast the non-direct maintenance and engineering support operating expenditure is the actual operating expenditure outcomes for the financial year 2012-13.

This method is appropriate to forecast the required expenditure, based on the following:

- When the non-direct maintenance and engineering support maintenance expenditure outcome for the 2009-14 regulatory period is examined in real FY14 dollars, it can be seen that the maintenance expenditure overall has actually reduced during the last five years.
- The expenditure for the financial year 2012-13 is below the average expenditure seen during the 2009-14 regulatory period.
- Unpredictable nature of non-direct maintenance and engineering support maintenance activities.
- The significant differences in the scope and cost of individual non-direct maintenance and engineering support maintenance tasks.
- Whilst Ausgrid continue to undertake routine maintenance activities and the forward forecasting process is based on stable volumes of planned inspection tasks, the assumption has been made that non-direct maintenance and engineering support maintenance activities will be identified and addressed at much the same rate as what was experienced during the current 2009-14 regulatory period.

Whilst other forecasting methods were considered for the non-direct maintenance and engineering support maintenance cost categories, the base year method was considered the most appropriate forecasting method to forecast operational expenditure for the 2014-19 regulatory period.

The forecast expenditure for the non-direct maintenance and engineering support cost category is presented in Table 49.

Non-Direct and Engineering Support $K (FY14 real)	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**Total**
Transmission Mains OH	609	618	631	644	658	3,160
Transmission Mains UG	869	881	898	915	933	4,496
Transmission Substations	267	271	277	282	288	1,386
Zone Substations	2,820	2,862	2,921	2,983	3,046	14,631
Distribution Mains	10,825	10,987	11,217	11,455	11,700	56,185
Distribution Substations	6,175	6,268	6,399	6,534	6,674	32,050
Total Required Expenditure	21,565	21,887	22,343	22,814	23,298	111,907

Table 49 – Non-direct and engineering support forecast expenditure 2014-19 regulatory period

Vegetation Management Strategy & Forecast Expenditure

A.1 Introduction

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A.2 Strategy

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A.3 Forecast Outcomes

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Supporting documents

This System Maintenance Operating Expenditure Plan is supported by the forecast model titled 'ID00063 - Maintenance Opex Forecast Model.xlsx' which is provided as part of Ausgrid's regulatory proposal.