Basis of Preparation

2019/20 Response to Category Analysis RIN dated 18 December 2013

October 2020

Template - 2.1 Expenditure Summary

Table 2.1.1 - STANDARD CONTROL SERVICES CAPEX

Compliance with Requirements of the Notice

The information reported in table 2.1.1 is derived from other worksheets in the CA RIN. The total gross capex in the table is in accordance with Ausgrid's Cost Allocation Methodology (CAM). The information reported also complies with Australian Accounting Standards and the Regulatory Information Requirements Guidelines for the NSW Electricity Distributors.

The financial data provided in this submission is for the year ended 30 June 2020.

Source of Information

Source of information for template 2.1, table 2.1.1 Standard Control Services Capex

1. Replacement expenditure is linked to table 2.2.1 'Replacement Expenditure, Volumes and Asset Failures by Asset Categories'
2. Connections capex is linked to table 2.5.2 'Cost metrics by Connection Classification'
3. Augmentation Expenditures is linked to table 2.3.4 'Augex data Total Expenditure'
4. Non-network expenditure is linked to table 2.6.1 'Non-Network Expenditure'
5. Capitalised network overhead cost is linked to tab 2.10(A) table 2.10.1 'Network Overheads Expenditure'
6. Capitalised corporate overheads cost is linked to tab 2.10(A) table 2.10.2 'Corporate Overheads Expenditure'
7. Capital contributions are sourced from the Ausgrid accounting system - SAP and allocated as per CAM to obtain the Standard Control Services portion. Capital contributions assets relate to standard control services distribution business.

Methodology & Assumptions

Total gross capital expenditure for the Standard Control Services reported in template 2.1.1 has been prepared in accordance with Ausgrid's CAM. The capital contribution is obtained using SAP and allocated using Ausgrid's CAM to calculate the Standard Control Services portion. It is noted that capital contributions do not represent expenditure incurred by Ausgrid and reflect assets gifted to Ausgrid. Capital contribution is reported as a separate line item in table 2.1.1. The value of capital contributions

recognised is based on an internal asset valuation model maintained by the customer connections team at Ausgrid and added directly to the Fixed Asset Register as additions.

Note: The AER have requested that the RIN data for SCS capex and opex tables be split to show costs for dual assets (Transmission) and Distribution. The AER RIN table does not provide for this split. The table below shows the required split of opex and capex between dual function assets (Transmission) and Distribution.

Capex	Standard Control Service	Transmission (Dual Function Assets)	Distribution Business (excluding Transmission)	Check
Replacement expenditure	291,933,954	26,895,632	265,038,322	-
Connections	25,042,083	180,532	24,861,550	-
Augmentation Expenditure	25,971,936	14,315,947	11,655,989	-
Non-network	85,917,310	10,143,021	75,774,289	-
Capitalised network overheads	107,629,566	7,825,853	99,803,713	-
Capitalised corporate overheads	5,345,458	635,436	4,710,022	-
Metering	0	0		-
Public Lighting				-
balancing item	121,975,572		121,975,572	-
capcons (included in the above)	121,975,572		121,975,572	-
TOTAL GROSS CAPEX (including capcons)	**663,815,877**	**59,996,421**	**603,819,457**	-
				-
				-
Opex				-
etation management	41,817,368	1,568,923	40,248,445	-
Maintenance	34,386,570	1,290,131	33,096,439	-
Emergency Response	46,680,079	2,312,312	44,367,768	-
Non-network	119,099,705	5,899,639	113,200,066	-
Network overheads	118,279,867	6,529,840	111,750,026	-
Corporate overheads	43,184,789	2,384,089	40,800,699	-
Metering				-
Public Lighting				-
balancing item				
TOTAL OPEX	**403,448,378**	**19,984,935**	**383,463,443**	-

Assumptions:

N/A

Use of Estimated Information

Not applicable

Reliability of Information

N/A

Table 2.1.2 - STANDARD CONTROL SERVICES OPEX

Compliance with Requirements of the Notice

The information reported in table 2.1.2 is derived from other worksheets in 2019/2020 CA RIN. The total operating expenditure in the table aligns with principles set out in Ausgrid's CAM.

Source of Information

Source of information for table 2.1.2 - Standard Control Services Opex

1. Vegetation management opex is linked to table 2.7.2 'Vegetation Management', Expenditure Metrics by Zone
2. Maintenance opex is linked to table 2.8.2 'Vegetation Management', Cost Metrics for routine and non-routine maintenance
3. Emergency response opex is linked to table 2.9.1 'Emergency Response Opex'
4. Non network opex is linked to table 2.6.1 'Non Network Expenditure Opex'
5. Network overhead cost is linked to tab 2.10(A), table 2.10(A).1 'Network Overheads'
6. Corporate overhead cost is linked to tab 2.10(A), table 2.10(A).2 'Corporate Overheads'

Methodology & Assumptions

Total operating expenditure for Standard Control Services reported in worksheet 2.1.2 aligns with principles set out in Ausgrid's CAM. Total operating expenditure reported in table 2.1.2 also aligns to operating expenditure reported in the Economic Benchmarking RIN and the Annual Reporting RIN for 2019/2020.

Assumptions:

N/A

Use of Estimated Information

All data reported is obtained from relevant worksheets. Please refer to the basis of preparation for these worksheets.

Reliability of Information

N/A

Table 2.1.3 - ALTERNATIVE CONTROL SERVICES CAPEX

Compliance with Requirements of the Notice

The information reported in the tables is derived from other worksheets. The total reported in the table aligns with principles set out in Ausgrid's CAM.

Source of Information

Alternative Control Services capital expenditure is from SAP Business Intelligence system.

Source of information for table 2.1.3 - Alternative Control Capex

1. Capitalised network overhead cost is linked to tab 2.10(A) table 2.10.1 'Network Overheads Expenditure'
2. Capitalised corporate overhead cost is linked to tab 2.10(A) table 2.10.2 'Corporate Overheads Expenditure'
3. Metering capex is linked to table 4.2.2 'Cost Metrics' - IT infrastructure capex represents allocation of capital expenditure relating to metering as per Ausgrid's CAM.
4. Public lighting capex is linked to table 4.1.2 'Descriptor Metrics Annually'
5. Fee and quoted services capex is sourced from the Ausgrid accounting system - SAP Business Intelligence system. It is capex allocated to fee and quoted services according to Ausgrid's CAM.
6. Balancing item relates to capitalised network and corporate overheads.

Methodology & Assumptions

Alternative Control Services capital expenditure has been prepared using principles set out in Ausgrid's CAM.

The balancing item relates to capitalised network and corporate overheads. Ausgrid is required to separately disclose capitalised overheads in tables 2.1.3 & 4 and also report total costs for metering, public lighting and fee & quoted services this leads to overheads been double counted for ACS. To overcome the double counting of costs in these tables, Ausgrid has used the balancing item row to report total capitalised network and corporate overheads and reported it as a negative value.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 2.1.4 - ALTERNATIVE CONTROL SERVICES OPEX

Compliance with Requirements of the Notice

The information reported in the table is derived from other worksheets. The total in the table aligns with principles set out in Ausgrid's CAM.

Source of Information

Source of information for table 2.1.3 - Alternative Control opex

1. Network overhead cost is linked to tab 2.10(A) table 2.10.1 'Network Overheads Expenditure'
2. Corporate overhead cost is linked to tab 2.10(A) table 2.10.2 'Coporate Overheads Expenditure'
3. Metering opex is linked to table 4.2.2 'Cost Metrics' and it is sum of metering business cost categories:
    - Meter testing
    - Meter investigation
    - Scheduled meter reading
    - Special meter reading
    - Meter maintenance
    - Other metering

Methodology & Assumptions

Alternative Control Services operating expenditure has been prepared using principles set out in Ausgrid's CAM.

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 2.1.5 - DUAL FUNCTION ASSETS CAPEX

Compliance with Requirements of the Notice

The total in table 2.1.5 aligns with principles set out in Ausgrid's CAM.

Source of Information

Dual function asset capital expenditure reported in table 2.1.5 is prepared from the SAP Business Intelligence system.

Methodology & Assumptions

The Dual Function Assets capital expenditure reported in template 2.1.5 has been prepared in accordance with Ausgrid's CAM. The information is from the SAP Business Intelligence system and allocated using Ausgrid's CAM to calculate the Dual Functions Assets portion.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 2.1.6 - DUAL FUNCTION ASSETS OPEX

Compliance with Requirements of the Notice

The information reported in the tables is prepared from other worksheets

Source of Information

Dual function assets operating expenditure categories reported in table 2.1.6 is Standard Control Services operating expenditure reported in table 2.1.2 multiplied by the Transmission operating expenditure percentage (described in the methodology section below).

Methodology & Assumptions

Dual function assets operating expenditure reported in table 2.1.6 is calculated based on numbers reported in table 2.1.2 for Standard Control Services, multiplied by the Transmission operating expenditure percentage for 2019/2020.

For the Category Analysis RIN purposes, the Transmission operating expenditure percentage for 2019/2020 is a portion of Transmission operating expenditure over total Transmission and Distribution operating expenditure for 2019/2020.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Template - 2.2 Repex

Table 2.2.1 - REPLACEMENT EXPENDITURE, VOLUMES AND ASSET FAILURES BY ASSET CATEGORY 1

Compliance with Requirements of the Notice

The information in this table is compliant in that actual values are used wherever possible, and best estimates are provided where actual data is not available.

Source of Information

The source for the data for this section has been Ausgrid's Corporate Information System (SAP). This includes data in categories poles, transformers, switchgear, and other (excluding meters). Expenditure data was sourced from Standard financial reports (BI Capex by LOB Snapshot report) using the snapshot data captured on 16/07/2020

Asset Replacement volumes were generated from SAP for Replacement programs (i.e Capital programs with a replacement or compliance driver). This extract was obtained from Ausgrid's corporate reporting tools (Business Objects (BO)/Business Intelligence (BI)) and GIS data. Replacement volumes for the replacement/compliance driven major projects (Area Plans) are sourced from Ausgrid's planning system (BPC - Business Planning & Consolidation).

Please refer to RIN table 4.1 for expenditure and volume data associated with public lighting in 2019/20. Ausgrid believed that it is inappropriate to 'double count' this data as part of table 2.2 Repex as this table is meant to reconcile with the 'Replacement Expenditure' in table 2.1.1 which is for standard control services only.

Methodology & Assumptions

Asset Replacements Expenditure and Volumes

To provide the expenditure and volume of assets replaced, extracts were obtained from SAP detailing the replacement and compliance component of the following:

- Replacement Programs (e.g Replacement & Duty of Care sub-programs)
- Major projects (Area Plans).

This extract was then mapped from the relevant planning identifiers to the associated AER's RIN Replacement Expenditure (Repex) Asset Group and Asset Category as describe below.

Replacement and Duty of Care Programs

SAP reports provide the historical replacement volumes and associated expenditure at Ausgrid's individual program level. Ausgrid has a detailed mapping table which is used to translate the reported replacement program expenditure and volumes to the relevant RIN Asset Categories. Where a program is unrelated to age and is being driven by other factors (e.g. decommissioning of assets due to redundancy), this expenditure and volumes are reported in the Other category since these expenditures and volumes cannot be benchmarked using the repex model.

Volume Mapping Table

A detailed mapping table is used to translate program volumes into the Table 2.2.1 Asset Categories. The mapping table has a one to many relationships, allowing program volumes to be reported against multiple asset categories. For example: Ausgrid Kiosk Replacement programs are mapped to 5 different asset categories (LV cable, 11kV Cable, Kiosk Transformer, 11kV Switch and LV Switchboard assets) that are retired when a kiosk is replaced.

Expenditure Mapping Table

A detailed mapping table is used to translate program expenditure into the Table 2.2.1 Asset Categories. For each program, expenditure is allocated to the exact same asset categories as the volume mapping table based on the proportion of their cost based on a standard cost estimate for these projects. This enables the expenditure associated with projects that span multiple asset categories to be apportioned to the appropriate RIN asset category.

Major Projects (Area Plan)

For major replacement projects Ausgrid develops detailed project estimates of asset volumes retired and installed by asset category. Project expenditures are then allocated based on the replacement cost of the assets retired/replaced. Planning systems have been used to report the historical volume of assets retired by major project.

FY20 actual expenditure data is captured at the project level. This is then allocated to Ausgrid's asset categories on the basis of planning estimates/unit rates. These expenditure allocations are then mapped to the appropriate Repex RIN 'Asset Group' and 'Asset Category'.

Other Repex Expenditures

Support and unallocated costs, which do not map directly to any RIN categories, have been apportioned across the RIN categories. These costs are predominantly characterised by Switching, Control and GIS Data Capture components. The apportionment is based on the association between the nature of these costs and the RIN categories.

Assumptions:

The estimates and apportionment methods are set out below:

Replacement Programs

Poles: Pole expenditures are allocated based on the distribution of Ausgrid's pole population. Staking of wooden pole is a direct mapping of a replacement program.

Pole-top Structures: Distribution pole cross arm replacements are apportioned according to the distribution of Ausgrid's distribution pole population.

Conductors: For projects that replace a span of overhead conductor, the span length is assumed to be 50m long for conductors operating at less than 22kV and 100m for greater than 22kV. The replacement of pole mounted substations includes the replacement of 100m of <1kV and 100m >1kV & <=11kV Overhead Conductors.

Cables: Kiosk Substation replacements projects are assumed to replace 100m of <=1kV Underground Cable and 10m of >1kV & <=11kV Underground Cable. The replacement of 11kV UGOHs (Underground to Overhead terminations) includes the replacement of 20m of >1kV & <=11kV Underground Cable. The replacement of 33kV Sealing Ends includes the replacement of 30m of > 22 KV & < = 33 KV Underground Cable.

Service Lines: Service line replacement expenditure and volumes are are allocated based on the distribution of Ausgrid's service line population.

Switchgear: In general all direct costs were mapped directly to the relevant asset category.

Other

In accordance to the 'AER Guide to the Repex Model' and the 'AER Repex Tool Tutorial' as provided to Ausgrid by Nuttall Consulting and on the AER website, only 'Non-demand-driven replacement of an asset with its modern equivalent, where the timing of the need can be directly or implicitly linked to the age of the asset' is applicable to the Repex model. As a result, any Replacement or Duty of Care programs that are not age or condition driven is classified as 'Other' asset category (i.e. non-condition driven safety or non-condition driven environmental expenditures). Since these programs have a mixed unit of measure, it is inappropriate to provide summated volumes for these assets. Detailed individual program volume is available and can be provided upon request.

Major Projects (Area Plans)

Due to the scale and duration of these projects, asset volumes were aligned with expenditures on the basis of project cashflows rather than being reported on project completion. Since Ausgrid's major

projects span across multiple years and due to the long lead time of major projects, it is appropriate to partially recognise the asset volume based on the percentage of actual expenditure in FY20 against the expected total cost, multiplied by the total volume at project completion. This method ensures that expenditures and volumes for significant expenditures are correlated for Repex modelling.

It is also appropriate to classify the Repex portions of buildings in the Area Plans as 'Other' asset category. This is because expenditures incurred for buildings in the Area Plans aren't driven by the age or conditions from these assets themselves.

OTHER REPEX EXPENDITURES

System property and support costs (i.e. GIS data capture and switching) associated with Repex is also included as 'Other' asset category.

Use of Estimated Information

Not all data is held at a sufficiently granular level required to populate the asset categories/asset metrics directly so it is necessary to estimate expenditures and volumes for some asset categories. A significant number of programs do involve like for like replacement of an asset that is mapped to an individual asset category, however, often there are other programs that involve the replacement of minor quantities of supporting assets where assumptions need to be made to capture the volume of these replacements. As a result, it is not possible to definitively say that Repex data is actual expenditure.

Reliability of Information

Whilst the reported data is estimated it is believed that this reported data accurately reflects the replacement expenditure by asset category.

Table 2.2.1 - REPLACEMENT EXPENDITURE, VOLUMES AND ASSET FAILURES BY ASSET CATEGORY 2

Table 2.2.2 - SELECTED ASSET CHARACTERISTICS 2

Compliance with Requirements of the Notice

Ausgrid sources records from asset systems which to the best of our knowledge reflects actuals. Updating of these asset systems is maintained through governance processes. Where data is not available or requires review, best estimates are provided.

Source of Information

Table 2.2.1

The source for the failure data for this section has been SAP PM (Plant Maintenance). This includes data in categories poles, transformers, switchgear, SCADA etc. The information supplied within this RIN is from specifically written SAP Business Objects reports to extract asset failures within the RIN period.

Please refer to RIN table 4.1 for expenditure, volume and failure data associated with public lighting. Ausgrid believed that it is inappropriate to 'double count' this data as part of table 2.2 Repex as this table is meant to reconcile with the 'Replacement Expenditure' in table 2.1.1 which is for standard control services only.

Table 2.2.2

Volume data for overhead conductors, underground cables and service lines has been sourced from Ausgrid's Geographical Information System (GIS). Volume data for poles and transformers has been sourced from SAP PM (Plant Maintenance). Information is provided consistent with methodology in RIN 5.2.

Ausgrid performs an annual feeder re-categorisation which is based on the loading and length of the feeder as per STPIS definitions. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible. It is dependent on the established definitions of the four feeder categories (CBD, Urban, Short Rural and Long Rural) as defined in the Licence Conditions (revised in July 14) Clause 19 and detailed below:

- **CBD Sydney Feeder** - A feeder forming part of the triplex 11kv cable system supplying predominately commercial high-rise buildings, within the City of Sydney.
- **Urban Feeder** - A feeder, which is not a CBD Sydney feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km.

- **Short Rural Feeder** - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length less than 200km.
- **Long Rural Feeder** - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length greater than 200km.

The feeder categories are updated and stored in TOAD which flows to the Business Objects reporting environment. Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. For example feeder length varies as a result of network open point changes or augmentation, and feeder load can vary due to changes in demand from existing or new customers on the feeder - such as weather factors, customers installing PV, or an apartment building constructed where a house was. Therefore the annual feeder classification review is undertaken to determine each feeders appropriate feeder category, in line with our distribution licence conditions.

Methodology & Assumptions

Table 2.2.1

Asset failure data is extracted from SAP with the breakdown flag and then mapped to a RIN asset category using the asset population data.

To align the asset failures categories for Service Lines to the asset population, simple type has been assigned to Overhead service connections and Complex type assigned to Underground service connections to align to 5.2 Age Profile.

Where there are no available information of a failed part or description that correlates to a RIN asset category, a manual allocation is necessary to map the failed part to a RIN Category using other available information such as the asset category type, failed asset part, its functional location or the description of the failure in the notification.

Non functional failures such as blown fuses have been excluded as a blown fuse has operated as intended and is not a functional failure.

Table 2.2.2

A feeder as defined in the Licence Conditions means a high voltage line operating at over 1kV and generally at or below 22kV that connects between a zone substation and a distribution substation.

Poles by Feeder Type

Total poles by feeder type were obtained by mapping the pole population to the feeder classification within GIS. Only poles with a RIN feeder classification is reported in this section as not all poles are

assigned a feeder category (e.g. sub-transmission poles). Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible.

Overhead/Underground Lengths by Feeder Type

Total lengths by feeder type were obtained by mapping overhead conductors and underground cables to the feeder classification data within GIS. Only feeders with a RIN feeder classification is reported in this section as not all overhead/underground lengths are assigned a feeder category (e.g. sub-transmission feeders). Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible

OH Conductor Length by Material Type

To provide the volume of assets currently in commission as at the end of the financial year, a GIS Report (ODRC_Network_Age) was used to identify conductor lengths by category using the conductor material as the primary count.

Transformers by Total MVA

The total MVA capacity is the sum of the total MVA for the distribution transformers and the total for the zone transformers for all power transformer population are in service (ie. Commissioned) in the RIN year.

Replaced = if the decommissioned transformer/inventory number within a functional location (FLOC) is different (i.e. another transformer in the same FLOC) compared to the previous RIN year.

Disposed of = if the decommissioned inventory number/transformer within a FLOC is unavailable (i.e. retired) compared to the previous RIN year.

Assumptions:

Where there are no available information of a failed part or asset description that correlates to a RIN asset category, a manual allocation is necessary to map the failed part to a RIN Category using other available information such as the asset category type, failed asset part, its functional location or the description of the failure in the notification.

Use of Estimated Information

The estimates provided are the best estimates as they are deemed to be the most logical approach based on the judgement of the subject matter expert.

Reliability of Information

There were a few major incidents that occurred on the network during Jan-Mar including bushfires and storms that affected predominantly poles and power lines which contributed to the high failures for FY20.

Table 2.2.2 - SELECTED ASSET CHARACTERISTICS 1

Compliance with Requirements of the Notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of Information

The source for the majority of data for this section has been Ausgrid's standard Corporate Information System (SAP) and GIS reports. SAP provides data in categories poles, transformers, switchgear, and others (excluding meters) while data for overhead conductors, underground cables and service lines has been sourced from Ausgrid's GIS.

Methodology & Assumptions

Asset Volume and Replacements

Poles by Feeder Type

Total poles by feeder type were obtained by mapping the pole population to the feeder classification within GIS. Only poles with a RIN feeder classification is reported in this section as not all poles are assigned a feeder category (e.g. sub-transmission poles). Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible.

The relative proportions of commissioned assets (Table 2.2.2 column 1) were applied to the replacement volumes (Table 2.2.1) to calculate asset replacement by characteristics (Table 2.2.2 column 2).

Overhead/Underground Lengths by Feeder Type

Total lengths by feeder type were obtained by mapping overhead conductors and underground cables to the feeder classification data within GIS. Only feeders with a RIN feeder classification is reported in this section as not all overhead/underground lengths are assigned a feeder category (e.g. sub-transmission feeders). Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible

OH Conductor Length by Material Type

To provide the volume of assets currently in commission as at the end of the financial year, a GIS Report (ODRC_Network_Age) was used to identify conductor lengths by category using the conductor material as the primary count.

Replacement volumes were estimated, and this estimation is explained in the following section. In some cases it was possible to map individual replacement porgrams to conductors of a specifc material type.

Transformers

Transformers by Total MVA

The total MVA capacity is the sum of the total MVA for the distribution transformers and the total for the zone transformers for all power transformer population are in service (ie. Commissioned) in the RIN year.

Replaced = if the decommissioned transformer/inventory number within a functional location (FLOC) is different (i.e. another transformer in the same FLOC) compared to the previous RIN year.

Disposed of = if the decommissioned inventory number/transformer within a FLOC is unavailable (i.e. retired) compared to the previous RIN year.

Assumptions:

Pole & Pole-top Structure replacement:

To provide information for this asset group and asset categories, the extract obtained from CIS as detailed above was filtered to display only data associated with pole replacement activities.

For installed assets:

- Pole asset failure information is provided based on historical records.
- Total poles by feeder type were obtained from Ausgrid's GIS. Asset replacements were apportioned on the basis of pole population per feeder type as the historical assignment of feeder and hence feeder category is not held against the retired pole.

Conductors

The conductor lengths were apportioned to provide the required length by feeder category and conductor material. The feeder categories were apportioned on the basis of length of feeder in each class. Similarly the apportionment to material type was also done on the basis of length of conductor in each material class.

Cables

The cable lengths were apportioned to provide the required data by feeder category. The feeder categories were apportioned on the basis of length of feeder in each category class.

Asset Volumes Currently in Commission

Poles

To provide the pole count by Category, a GIS extract on assigned feeder category was used to develop a ratio of poles per feeder category. This ratio was assigned to the pole population by voltage sourced from the RIN Tab 5.2 where voltage <= 22kV.

OH Conductor Length by Feeder Type

To provide the OH conductor lengths by feeder type as at the end of the financial year, a GIS report (ODRC_Zone_Category_Totals) was used to identify HV/LV overhead line asset categories with an operating voltage of <=22kV (not including service cables, mains, auxiliary, SL and unknowns). A percentage of category based cable length was calculated and that percentage applied to the source data from a separate GIS report (ODRC_Network_Age).

Ausgrid only applies a feeder type category to feeder cables and conductor with an operating voltage of <=22kV. It's not possible to assign feeder category to feeders above 22kV because they supply networks which would cover multiple feeder categories.

UG Cable Length by Feeder Type

To provide the UG cable lengths by feeder type as at the end of the financial year, a GIS report (ODRC_Zone_Category_Totals) was used to identify HV/LV underground cables with an operating voltage of <=22kV (excluding service cables, mains, auxiliary, SL and unknowns). A percentage of category based cable length was calculated and that percentage applied to the source data from a separate GIS report (ODRC_Network_Age). Ausgrid only applies a feeder type category to feeder cables and conductor with an operating voltage of <=22kV. It's not possible to assign feeder category to feeders above 22kV because they supply networks which would cover multiple feeder categories.

Use of Estimated Information

Pole replacement

- Data is not held at the granular level required to populate the asset categories/asset metrics directly.

Pole Top Structures

- Data is not held at the granular level required to populate the asset categories/asset metrics directly.

Overhead conductors

- Data is not held at the granular level required to populate the asset categories/asset metrics directly. Where possible, material specific programs have been allocated directly to the appropriate material categories.

Underground cables

- Data is not held at the granular level required to populate the asset categories/asset metrics directly.

Reliability of Information

N/A

Template - 2.3 Augex

Table 2.3.1 - AUGEX ASSET DATA - SUBTRANSMISSION SUBSTATIONS, SWITCHING STATIONS AND ZONE SUBSTATIONS 1

Table 2.3.2 - AUGEX ASSET DATA - SUBTRANSMISSION LINES 1

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER up until 7th March 2014 and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

It is worthwhile noting that the technical data for projects still under construction can be an estimate based on the best data available and advice from subject matter experts (i.e. we've consider then as actual in a RIN data entry perspective).

Source of Information

Sub-transmission projects

- Business Intelligence (BI) reports from the Corporate Information System (CIS) as the primary source of historical costs for materials, contract services, other costs, labour and associated man hours (updated for the full 2019/20 actual expenditure data);
- CIS BI reports from the forecasting system as the primary source of forecast costs, asset quantum and allocations requirements when historical information isn't readily available;
- A combination of CIS, GIS, RIC and System Diagrams are used for actual asset quantum and certain technical data.

Methodology & Assumptions

The method and assumptions are as follows:

Step 0. RIN information has been provided in prior years and is deemed to be complaint by the AER. Thus, it is not unreasonable to assume that the 2019/20 RIN should only be an update using the 2018/19 YTD actual expenditure data unless more accurate data is available that supersede any previous data provided (i.e. this provides a mechanism to improve on data quality).

Step 1. For network projects with expenditure within 2019/20, associated substation projects with an augmentation component greater than or equal to $5 million over the life of the project were identified (note: Ausgrid uses an incremental capacity methodology to determine its augmentation component as required by the National Electricity Rules (NER)). However, once the applicable projects are identified, the full expenditure for each project is presented (including costs associated with other drivers for expenditure, e.g. replacement) rather than its theoretical fraction.

Step 2. For projects with both substation and sub-transmission network components, the project is further interrogated by its work breakdown structure (WBS). For projects of this nature, only the expenditure of the substation component will be included. In addition, any associated distribution work to enable the commissioning of the substation will be included (i.e. 11kV connection expenditures).

Step 3. Provide the actual and forecast expenditure where these have or will be incurred.

Step 4. For projects with actual incurred expenditure, information is provided in the following order:

- Transformers expenditure (exclude distribution, auxiliary and earthing transformers);
- Switchgear expenditure (include primary switchgears on both the high and low side of the substation);
- Capacitors expenditure (for capacitors within the substations that offer capacitive and voltage support);
- Other plant item expenditure (based on the total 'Material' booked to the project minus item 1, 2 & 3 above);
- Installation labour expenditure (uses the 'Labour-Direct' cost element of the project);
- Installation labour volume (uses associated labour component in project system and payroll);
- Easements expenditure (usually booked against the project itself);
- Civil works expenditure (based on the total 'Contract Services' booked to the project minus item 7 above);
- Other direct expenditure (uses the 'Other-Direct' cost element of the project);
- Land Purchase expenditure (from a separate report as land is booked separately from the project).

Note:

- *Item 1, 2 & 3 above are based on either separate reports that itemises the materials booked to the project more accurately or financial asset class breakdown in CIS BI.*
- *All monetary figures provided in Step 4 are as incurred (i.e. Nominal $).*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 5. For projects with expected forecast expenditure, information is provided in the following order;

- For projects already midway through its investment cycle, it is assumed that all major equipment is already procured and that the expected forecast expenditure for 'material' is part of 'Other Plant Item' only;
- For projects not yet authorised, the forecast 'material' expenditure at the asset category level is used;
- Installation Labour expenditure is determined by using the direct costs component of the expected expenditure using historical cost allocation;
- Installation Labour volume is determined using the result of item 3 above and dividing it by the average unit rate of direct labour ($/man hour);
- Civil Works expenditure (based on 'Contract Services' cost element);
- Other Direct expenditure (assumed to be included as part of item 5 above).
- Any cancelled projects with expenditure in 2018/19 are not included (i.e. total project will be less than $5m)

Note:

- *The monetary figures used in Step 5 are in nominal $.*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 6. Ausgrid has no 'Related Party Margins' and/or 'Non-Related Party Contracts' for these projects.

Step 7. Provide associated technical information for each project;

- Transformers units added (based on material booked to the project and checked against various corporate systems mentioned above);

- Transformers MVA added (based on information from various corporate systems mentioned above);
- Switchgear units added (based on material booked to the project and checked against various corporate systems mentioned above);
- Capacitors MVAR added (based on information from various corporate systems mentioned above);
- Substation ratings (pre and post), voltages, types and triggers are determined by subject matter experts with reference to project briefs, engineering systems (e.g. Ratings and Impedance Calculator (RIC)).

Ratings used are 'Normal Cyclic' Substation ratings. This is the throughput rating as defined in the notes for RIN Section 2.4. 'Normal condition' for the purposes of the Augex model is defined the planned network configuration, with no assets unavailable due to planned or unplanned outages.

For Project Type, 'New substation establishment' includes projects where a substation is established on a new site, even if it is in part driven by the replacement of an older substation.). Where an upgrade (including changes to primary voltage) occurs on the same location, 'Substation upgrade - capacity' is used.

Explanation of 'Other-please specify' records

A number of substations have the 'Project Trigger' identified as 'Other - please specify'. Summary of Substation Projects with 'Project 'Trigger' identified as 'Other': Information is provided as follows:

Substation ID	**Project ID**	**Primary Trigger**	**Secondary Trigger**
New Rockdale 132/11kV ZN (SJ-05993)	ARA_04.1.0008	Replacement	Augmentation
Crows Nest ZN 132kV Conversion (SJ-05651)	ARA_05.1.0006	Replacement	Augmentation

It should be noted that in the previous review conducted in 2018/19, the list above also included the projects to convert Engadine Zone Substation into 132kV operation, and to establish New Charlestown and New Aberdeen zone substations. They have been excluded because expenditure in these projects ended in 2018/19.

Step 8. Assign primary and secondary trigger for each project identified above. For projects where the primary trigger is augmentation, 100% of the project cost is considered to be augmentation. For projects where the primary driver is not augmentation, the projects with a secondary trigger in augmentation exceeding $5m are identified in the table above (step 7) and their relevant information is readily available to review upon request.

Step 9*. As requested in Appendix E, 1.9 and 1.10 then later specified in 7.2 (c) the actual and forecast expenditures derived from the steps above are converted into real dollars ($2012-13) using the % CPI and indexations reported in the spreadsheet attached (RIN Table 2.3.1 and 2.3.2 FY19 update supporting info) under the "Escalation Factors" tab. This is then applied as an average escalation factor based on the years incurred.*

Assumptions:

Sub-Transmission projects

- The calculation for the augmentation component is based on a comparison between the preferred project that meet all identified network requirements versus a theoretical alternate project where no capacity constraints exists (i.e. incremental cost methodology). It is the best estimate because it is deemed that this is the most correct method to satisfy the regulatory investment test under chapter 5 of the NER.
- The method used to determine primary/secondary trigger is based on the severity of need. This can be measure using a combination of the cost difference, time criticality and other measurable impacts. This is in line with other NSP's evaluation their drivers.
- Please refer to Ausgrid's Area Plans documentations which outline the approach and assumption for the major project estimates provided.

The following are calculations requested by this table that are carried out outside of the processes in the steps above:

- Since indirect costs (i.e. Indirect Labour and Indirect Other) are embedded into the total labour cost within the forecast system, an allocation approach is used to separate the associated direct labour component. It is deemed that historical cost elements provide the most suitable basis for this allocation.
- The forecast installation labour volume is determined using the indirect labour derived above and dividing it by the average unit rate of direct labour ($/man hour). It is deemed that this is a reasonable approach given the timeframe and practicality of carrying out detail resource requirement against each project.

The procedure to populate Table 2.3.1 involved extensive manual analysis of information, as Ausgrid does not have any automated systems to generate this type of information. As this is the only method for Ausgrid to populate Table 2.3.1 the information used is the best available.

Use of Estimated Information

Sub-transmission projects

- The process to filter out the applicable projects above (Step 1) is by nature a theoretical estimation of the associated augmentation component. Naturally, it is not considered an estimate if the project is deemed to be 100% augmentation.
- As a result of how the template is setup, there is no mean to provide sensible inputs without resorting to a primary/secondary trigger to select meaningful projects applicable for this table and meet the RIN requirements at the same time.
- Any expected forecast expenditure is by nature an estimate.

There are no other estimates outside of what has already been stated for table 2.3.1 above.

Reliability of Information

N/A

Table 2.3.1 - AUGEX ASSET DATA - SUBTRANSMISSION SUBSTATIONS, SWITCHING STATIONS AND ZONE SUBSTATIONS 2

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER up until 7th March 2014 and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

It is worthwhile noting that the technical data for projects still under construction can be an estimates based on the best data available and advice from subject matter experts (i.e. we've consider then as actual in a RIN data entry perspective).

Source of Information

Sub-transmission projects

- Business Intelligence (BI) reports from the Corporate Information System (CIS) as the primary source of historical costs for materials, contract services, other costs, labour and associated man hours (updated for the full 2019/20 actual expenditure data);
- CIS BI reports from the forecasting system as the primary source of forecast costs, asset quantum and allocations requirements when historical information isn't readily available;
- A combination of CIS, GIS, RIC and System Diagrams are used for actual asset quantum and certain technical data.

Methodology & Assumptions

The method and assumptions are as follows:

Step 0. RIN information has been provided in prior years and is deemed to be complaint by the AER. Thus, it is not unreasonable to assume that the 2019/20 RIN should only be an update using the 2018/19 YTD actual expenditure data unless more accurate data is available that supersede any previous data provided (i.e. this provides a mechanism to improve on data quality).

Step 1. For network projects with expenditure within 2019/20, associated substation projects with an augmentation component greater than or equal to $5 million over the life of the project were identified (note: Ausgrid uses an incremental capacity methodology to determine its augmentation component as required by the National Electricity Rules (NER)). However, once the applicable projects are identified,

the full expenditure for each project is presented (including costs associated with other drivers for expenditure, e.g. replacement) rather than its theoretical fraction.

Step 2. For projects with both substation and sub-transmission network components, the project is further interrogated by its work breakdown structure (WBS). For projects of this nature, only the expenditure of the substation component will be included. In addition, any associated distribution work to enable the commissioning of the substation will be included (i.e. 11kV connection expenditures).

Step 3. Provide the actual and forecast expenditure where these have or will be incurred.

Step 4. For projects with actual incurred expenditure, information is provided in the following order:

- Transformers expenditure (exclude distribution, auxiliary and earthing transformers);
- Switchgear expenditure (include primary switchgears on both the high and low side of the substation);
- Capacitors expenditure (for capacitors within the substations that offer capacitive and voltage support);
- Other plant item expenditure (based on the total 'Material' booked to the project minus item 1, 2 & 3 above);
- Installation labour expenditure (uses the 'Labour-Direct' cost element of the project);
- Installation labour volume (uses associated labour component in project system and payroll);
- Easements expenditure (usually booked against the project itself);
- Civil works expenditure (based on the total 'Contract Services' booked to the project minus item 7 above);
- Other direct expenditure (uses the 'Other-Direct' cost element of the project);
- Land Purchase expenditure (from a separate report as land is booked separately from the project).

Note:

- *Item 1, 2 & 3 above are based on either separate reports that itemises the materials booked to the project more accurately or financial asset class breakdown in CIS BI.*
- *All monetary figures provided in Step 4 are as incurred (i.e. Nominal $).*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 5. For projects with expected forecast expenditure, information is provided in the following order;

- For projects already midway through its investment cycle, it is assumed that all major equipment is already procured and that the expected forecast expenditure for 'material' is part of 'Other Plant Item' only;
- For projects not yet authorised, the forecast 'material' expenditure at the asset category level is used;
- Installation Labour expenditure is determined by using the direct costs component of the expected expenditure using historical cost allocation;
- Installation Labour volume is determined using the result of item 3 above and dividing it by the average unit rate of direct labour ($/man hour);
- Civil Works expenditure (based on 'Contract Services' cost element);
- Other Direct expenditure (assumed to be included as part of item 5 above).
- Any cancelled projects with expenditure in 2018/19 are not included (i.e. total project will be less than $5m)

Note:

- *The monetary figures used in Step 5 are in nominal $.*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 6. Ausgrid has no 'Related Party Margins' and/or 'Non-Related Party Contracts' for these projects.

Step 7. Provide associated technical information for each project;

- Transformers units added (based on material booked to the project and checked against various corporate systems mentioned above);
- Transformers MVA added (based on information from various corporate systems mentioned above);
- Switchgear units added (based on material booked to the project and checked against various corporate systems mentioned above);
- Capacitors MVAR added (based on information from various corporate systems mentioned above);

- Substation ratings (pre and post), voltages, types and triggers are determined by subject matter experts with reference to project briefs, engineering systems (e.g. Ratings and Impedance Calculator (RIC)).

Ratings used are 'Normal Cyclic' Substation ratings. This is the throughput rating as defined in the notes for RIN Section 2.4. 'Normal condition' for the purposes of the Augex model is defined the planned network configuration, with no assets unavailable due to planned or unplanned outages.

For Project Type, 'New substation establishment' includes projects where a substation is established on a new site, even if it is in part driven by the replacement of an older substation.). Where an upgrade (including changes to primary voltage) occurs on the same location, 'Substation upgrade - capacity' is used.

Explanation of 'Other-please specify' records

A number of substations have the 'Project Trigger' identified as 'Other - please specify'. Summary of Substation Projects with 'Project 'Trigger' identified as 'Other': Information is provided as follows:

Substation ID	**Project ID**	**Primary Trigger**	**Secondary Trigger**
New Rockdale 132/11kV ZN (SJ-05993)	ARA_04.1.0008	Replacement	Augmentation
Crows Nest ZN 132kV Conversion (SJ-05651)	ARA_05.1.0006	Replacement	Augmentation

It should be noted that in the previous review conducted in 2018/19, the list above also included the projects to convert Engadine Zone Substation into 132kV operation, and to establish New Charlestown and New Aberdeen zone substations. They have been excluded because expenditure in these projects ended in 2018/19.

Step 8. Assign primary and secondary trigger for each project identified above. For projects where the primary trigger is augmentation, 100% of the project cost is considered to be augmentation. For projects where the primary driver is not augmentation, the projects with a secondary trigger in augmentation exceeding $5m are identified in the table above (step 7) and their relevant information is readily available to review upon request.

***Step 9**. As requested in Appendix E, 1.9 and 1.10 then later specified in 7.2 (c) the actual and forecast expenditures derived from the steps above are converted into real dollars ($2012-13) using the % CPI and indexations reported in the spreadsheet attached (RIN Table 2.3.1 and 2.3.2 FY19 update supporting info) under the "Escalation Factors" tab. This is then applied as an average escalation factor based on the years incurred.*

Assumptions:

Sub-Transmission projects

- The calculation for the augmentation component is based on a comparison between the preferred project that meet all identified network requirements versus a theoretical alternate project where no capacity constraints exists (i.e. incremental capacity methodology). It is the best estimate because it is deemed that this is the most correct method to satisfy the regulatory investment test under chapter 5 of the NER.
- The method used to determine primary/secondary trigger is based on the severity of need. This can be measure using a combination of financial difference, time criticalness and other measurable impacts. This is in line with how some DNSP evaluation their drivers.
- Please refer to Ausgrid's Area Plans documentations which outline the approach and assumption for the major project estimates provided.

The following are calculations requested by this table that are carried out outside of the processes in the steps above:

- Since indirect costs (i.e. Indirect Labour and Indirect Other) are embedded into the total labour cost within the forecast system, an allocation approach is used to separate the associated direct labour component. It is deemed that historical cost elements provide the most suitable basis for this allocation.
- The forecast installation labour volume is determined using the indirect labour derived above and dividing it by the average unit rate of direct labour ($/man hour). It is deemed that this is a reasonable approach given the timeframe and practicality of carrying out detail resource requirement against each project.

The procedure to populate Table 2.3.1 involved extensive manual analysis of information, as Ausgrid does not have any automated systems to generate this type of information. As this is the only method for Ausgrid to populate Table 2.3.1 the information used is the best available.

Use of Estimated Information

Estimates were provided for the following reasons:

- The process to filter out the applicable projects above (Step 1) is by nature a theoretical estimation of the associated augmentation component. Naturally, it is not considered an estimate if the project is deemed to be 100% augmentation.
- As a result of how the template is setup, there is no mean to provide sensible inputs without resorting to a primary/secondary trigger to select meaningful projects applicable for this table and meet the RIN requirements at the same time.
- Any expected forecast expenditure is by nature an estimate.

There are no other estimates outside of what has already been stated for table 2.3.1 above.

Reliability of Information

Table 2.3.2 - AUGEX ASSET DATA - SUBTRANSMISSION LINES 2

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER up until 7th March 2014 and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

It is worthwhile noting that the technical data for projects still under construction can be an estimates based on the best data available and advice from subject matter experts (i.e. we've consider then as actual in a RIN data entry perspective).

Source of Information

Sub-transmission lines

- CIS Business Intelligence (BI) reports from the transaction systems as the primary source of historical costs for materials, contract services, other costs, labour and associated man hours (updated for the full 2019/20 actual expenditure data);
- CIS BI reports from the forecasting system as the primary source of forecast costs, asset quantum and allocations requirements when historical information isn't readily available;
- GIS Transmission Feeder Reports, RIC and System Diagrams are used for actual asset quantum and certain technical data.
- Project Offers on any authorised projects for expected asset quantum.

Methodology & Assumptions

The method and assumptions are as follows:

Step 0. RIN information has been provided in prior years and is deemed to be complaint by the AER. Thus, it is not unreasonable to assume that the 2019/20 RIN should only be an update using the full 2018/19 actual expenditure data unless more accurate data is available that supersede any previous data provided (i.e. this provides a mechanism to improve on data quality).

Step 1. For network projects with expenditure within 2009/10-2019/20, isolate the associated substation projects with an augmentation component greater than or equal to $5 million over the life of the project (note: Ausgrid uses an incremental capacity methodology to determine its augmentation component as required by the National Electricity Rules (NER)). However, once the applicable projects are determined,

the full expenditure for each project is presented (including costs associated with other drivers for expenditure, e.g. replacement) rather than its theoretical fraction.

Step 2. For projects with both substation and subtransmission lines components, the project is further interrogated into its work breakdown structure (WBS). For projects of this nature, the substation component is excluded from the overall project costs. Thus, any associated distribution works will be included. This ensures that table 2.3.1 and 2.3.2 sums to the full cost of each project.

Step 3. Provide the actual and expected years where expenditures have and will incurred (note: project expenditures pre-2007/08 are not readily available due to the switching of financial systems at the time). In addition, data pre-2009/10 might not be as robust/accurate as recent data due to changes in booking practices.

Step 4. For projects with actual incurred expenditure, information is provided in the following order:

- Other plant item expenditure (uses the full 'material' cost element as expenditure cannot be readily separated sensibly and consistently for either overhead or underground construction);
- Some overhead/underground construction split is possible using financial asset class breakdown;
- Installation labour expenditure (uses the 'Labour-Direct' cost element of the project);
- Installation labour volume (uses associated labour component in project system and payroll);
- Easements expenditure (usually booked against the project itself);
- Civil works expenditure (based on the total 'Contract Services' booked to the project minus item 4 above);
- Other direct expenditure (uses the 'Other-Direct' cost element of the project);
- Land purchase expenditure (assume no land purchases associated with lines and cables);
- Easements expenditure (usually booked against the project itself).

Note:

- *All monetary figures provided in Step 4 are as incurred (i.e. Nominal dollars).*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 5. For projects with expected forecast expenditure, information is provided in the following order:

- For projects already midway through its investment cycle, it is reasonable to assume that all major equipment is already procured and that the expected forecast expenditure for 'material' is part of 'Other Plant Item' only;
- For projects not yet authorised, the expected 'material' expenditure at the asset category level is used;
- Installation Labour expenditure is determined by peeling out the direct costs component of the expected expenditure using historical cost allocation;
- Installation labour volume is determined using the result of item 3 above and dividing it by the average unit rate of direct labour ($/man hour);
- Civil works expenditure (based on 'Contract Services' cost element);
- Other direct expenditure (assumed to be included as part of item 5 above).

Note:

- *All monetary figures used in Step 5 are in nominal $.*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 6. It is reasonable to assume that Ausgrid have no 'Related Party Margins' and/or 'Non-Related Party Contracts'.

Step 7. Provide associated technical information for each project;

- Underground Circuit KM Added (for actual use GIS data and for expected use Project Offer or Forecast System data);
- Overhead Lines Circuit KM Added (for actual use GIS data and for expected use Project Offer or Forecast System data);
- Poles/Towers Added (is based item 2 above divided by an average span length of 75m);
- Route Line Length Added (based on subject matter expert investigations and advice);
- Project type, trigger and voltage determined by subject matter experts with reference to project briefs and engineering systems.

Explanation of 'Other-please specify' records:

- For one project - ARA_05.1.0006 - Project Type is listed as 'Other-please specify'. This project covers installation of 132kV cable sections and termination works related to the conversion of Crows Nest zone substation into 132kV operation.
- A number of project triggers are listed as 'Other - please specify'. These projects are primarily driven by condition issues, where some incremental additional capacity is installed due a forecast need for greater capacity in future, where economical to do so. The summary of these projects is below:

Substation ID	Project ID	Primary Trigger	Secondary Trigger
New Rockdale ZN 132kV connection works (SJ-06161)	ARA_04.1.0008	Replacement	Augmentation
Crows Nest ZN 132kV connection works (SJ-05651)	ARA_05.1.0006	Replacement	Augmentation

Step 8. Assign primary and secondary trigger for each project identified above. For projects where the primary trigger is augmentation, 100% of the project cost is considered to be augmentation. For projects where the primary driver is not augmentation, the projects with a secondary trigger in augmentation exceeding $5m are identified in the table above (step 7) and their relevant information is readily available to review upon request.

Step 9. Derive the Poles/Towers expenditures using Step 7 - item 3 above and an average unit rate of $1,200 per supporting structure. This derived expenditure is subtracted from the Other Plant Item expenditure in Step 4 - item 1 above to ensure that the overall project expenditure remains the same.

Step 10. As requested in Appendix E, 1.9 and 1.10 then later specified in 7.3 (c) the actual and forecast expenditures derived from the steps above are converted into real dollars ($2012-13) using the % CPI and indexations reported in the attached spreadsheet (RIN Tables 2.3.1 and 2.3.2 FY20 update supporting info) under the "Escalation Factors" tab. This is then applied as an average escalation factor based on the years incurred):

Assumptions:

The basis for the estimates and the reason why they are the best estimates:

- The calculation for the augmentation component is based on a comparison between the preferred project that meet all identified network requirements versus a theoretical alternate project where no capacity constraints exists (i.e. incremental capacity methodology). It is deemed that this is the only method that satisfies the regulatory investment test under chapter 5 of the NER.
- The method used to determine primary/secondary trigger is based on the severity of need. This can be measure using a combination of financial difference, time criticalness and other measurable impacts. This is in line with how some DNSP evaluation their drivers.
- Ausgrid's Area Plans documentation outlines the approach and assumption made for the project estimates provided. The Area Plans are provided as part of the regulatory proposal.

The following are calculations requested by RIN 2.3.2 that is carried outside of the processes in the steps above:

- Since indirect costs (i.e. 'Indirect Labour' and 'Indirect Other') are embedded into the total labour cost of the forecast system, an allocation approach is used to separate the associated direct labour costs. It is deem that historical cost elements provide the most suitable basis for this allocation.
- Installation labour volume is determined using the indirect labour derived above and dividing it by the average unit rate of direct labour ($/man hour). It is deemed that this is a reasonable approach given the timeframe and practicality of carrying out detail resource requirement against each project.
- In principle, when an estimate cannot be provided, it is because any known attempt to create this data is baseless and potentially leads to further misunderstanding of the information sought in the notice.

The procedure to populate table 2.3.2 involved extensive manual analysis of information, as Ausgrid does not have any automated systems to generate this type of information. As this is the only method for Ausgrid to populate table 2.3.2, the information used is the best available.

Use of Estimated Information

Estimates were provided for the following reasons:

- The process to filter out the applicable projects above (Step 1) is by nature a theoretical estimation of the associated augmentation component. Naturally, this is not an issue for projects deem to be 100% augmentation.

- As a result of how the template is setup, there is no mean to provide sensible inputs without resorting to a primary/secondary trigger to select meaningful projects applicable for this table and meet the RIN requirements at the same time.
- Any expected forecast expenditure is by nature an estimate.
- Specific expenditure regarding underground cables are not available in the corporate transaction systems as sub-transmission underground works are competitive tendered and the cable costs are typically embedded as part of the invoice deemed as contract services. As such no sensible estimate can be made as the procurement cost for material varies between service providers and is not typically privilege information.
- Circuit KM Upgraded is simply not captured in any known system and cannot be readily determine as there are no sensible information that to use as point of reference.
- Although some Poles/Towers Added can be found within each project, it is proven that the asset counts in the system are inaccurate and not sensible compare to the actual Circuit KM Added. As such, it is more appropriate to provide an estimate using the actual Circuit KM Added and the average span distances between two common types of constructions.
- Expenditure in overhead feeder is split equally between Poles/Towers and Overhead Lines.
- The conversion from actual dollars (nominal) to real dollars ($2012-13) is by nature an estimate.

Reliability of Information

N/A

Table 2.3.2 - AUGEX ASSET DATA - SUBTRANSMISSION LINES 3

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER up until 7th March 2014 and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

It is worthwhile noting that the technical data for projects still under construction can be an estimates based on the best data available and advice from subject matter experts (i.e. we've consider then as actual in a RIN data entry perspective).

Source of Information

Sub-transmission lines

- CIS Business Intelligence (BI) reports from the transaction systems as the primary source of historical costs for materials, contract services, other costs, labour and associated man hours (updated for the full 2019/20 actual expenditure data);
- CIS BI reports from the forecasting system as the primary source of forecast costs, asset quantum and allocations requirements when historical information isn't readily available;
- GIS Transmission Feeder Reports, RIC and System Diagrams are used for actual asset quantum and certain technical data.
- Project Offers on any authorised projects for expected asset quantum.

Methodology & Assumptions

The method and assumptions are as follows:

Step 0. RIN information has been provided in prior years and is deemed to be complaint by the AER. Thus, it is not unreasonable to assume that the 2019/20 RIN should only be an update using the full 2018/19 actual expenditure data unless more accurate data is available that supersede any previous data provided (i.e. this provides a mechanism to improve on data quality).

Step 1. For network projects with expenditure within 2009/10-2019/20, isolate the associated substation projects with an augmentation component greater than or equal to $5 million over the life of the project (note: Ausgrid uses an incremental capacity methodology to determine its augmentation component as required by the National Electricity Rules (NER)). However, once the applicable projects are determined,

the full expenditure for each project is presented (including costs associated with other drivers for expenditure, e.g. replacement) rather than its theoretical fraction.

Step 2. For projects with both substation and subtransmission lines components, the project is further interrogated into its work breakdown structure (WBS). For projects of this nature, the substation component is excluded from the overall project costs. Thus, any associated distribution works will be included. This ensures that table 2.3.1 and 2.3.2 sums to the full cost of each project.

Step 3. Provide the actual and expected years where expenditures have and will incurred (note: project expenditures pre-2007/08 are not readily available due to the switching of financial systems at the time). In addition, data pre-2009/10 might not be as robust/accurate as recent data due to changes in booking practices.

Step 4. For projects with actual incurred expenditure, information is provided in the following order:

- Other plant item expenditure (uses the full 'material' cost element as expenditure cannot be readily separated sensibly and consistently for either overhead or underground construction);
- Some overhead/underground construction split is possible using financial asset class breakdown;
- Installation labour expenditure (uses the 'Labour-Direct' cost element of the project);
- Installation labour volume (uses associated labour component in project system and payroll);
- Easements expenditure (usually booked against the project itself);
- Civil works expenditure (based on the total 'Contract Services' booked to the project minus item 4 above);
- Other direct expenditure (uses the 'Other-Direct' cost element of the project);
- Land purchase expenditure (assume no land purchases associated with lines and cables);
- Easements expenditure (usually booked against the project itself.

Note:

- *All monetary figures provided in Step 4 are as incurred (i.e. Nominal dollars).*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 5. For projects with expected forecast expenditure, information is provided in the following order:

- For projects already midway through its investment cycle, it is reasonable to assume that all major equipment is already procured and that the expected forecast expenditure for 'material' is part of 'Other Plant Item' only;
- For projects not yet authorised, the expected 'material' expenditure at the asset category level is used;
- Installation Labour expenditure is determined by peeling out the direct costs component of the expected expenditure using historical cost allocation;
- Installation labour volume is determined using the result of item 3 above and dividing it by the average unit rate of direct labour ($/man hour);
- Civil works expenditure (based on 'Contract Services' cost element);
- Other direct expenditure (assumed to be included as part of item 5 above).

Note:

- *All monetary figures used in Step 5 are in nominal $.*
- *The monetary figures represent the full cost for the project irrespective of the proportion of augmentation components (see note in Step 1 above).*

Step 6. It is reasonable to assume that Ausgrid have no 'Related Party Margins' and/or 'Non-Related Party Contracts'.

Step 7. Provide associated technical information for each project;

- Underground Circuit KM Added (for actual use GIS data and for expected use Project Offer or Forecast System data);
- Overhead Lines Circuit KM Added (for actual use GIS data and for expected use Project Offer or Forecast System data);
- Poles/Towers Added (is based item 2 above divided by an average span length of 75m);
- Route Line Length Added (based on subject matter expert investigations and advice);
- Project type, trigger and voltage determined by subject matter experts with reference to project briefs and engineering systems.

Explanation of 'Other-please specify' records:

- For one project - ARA_05.1.0006 - Project Type is listed as 'Other-please specify'. This project covers installation of 132kV cable sections and termination works related to the conversion of Crows Nest zone substation into 132kV operation.
- A number of project triggers are listed as 'Other - please specify'. These projects are primarily driven by condition issues, where some incremental additional capacity is installed due a forecast need for greater capacity in future, where economical to do so. The summary of these projects is below:

Substation ID	Project ID	Primary Trigger	Secondary Trigger
New Rockdale ZN 132kV connection works (SJ-06161)	ARA_04.1.0008	Replacement	Augmentation
Crows Nest ZN 132kV connection works (SJ-05651)	ARA_05.1.0006	Replacement	Augmentation

Step 8. Assign primary and secondary trigger for each project identified above. For projects where the primary trigger is augmentation, 100% of the project cost is considered to be augmentation. For projects where the primary driver is not augmentation, the projects with a secondary trigger in augmentation exceeding $5m are identified in the table above (step 7) and their relevant information is readily available to review upon request.

Step 9. Derive the Poles/Towers expenditures using Step 7 - item 3 above and an average unit rate of $1,200 per supporting structure). This derived expenditure is subtracted from the Other Plant Item expenditure in Step 4 - item 1 above to ensure that the overall project expenditure remains the same.

Step 10. As requested in Appendix E, 1.9 and 1.10 then later specified in 7.3 (c) the actual and forecast expenditures derived from the steps above are converted into real dollars ($2012-13) using the following % CPI and indexations reported reported in the attached spreadsheet (RIN Tables 2.3.1 and 2.3.2 FY20 update supporting info) under the "Escalation Factors" tab. This is then applied as an average escalation factor based on the years incurred).

Assumptions:

The basis for the estimates and the reason why they are the best estimates:

- The calculation for the augmentation component is based on a comparison between the preferred project that meet all identified network requirements versus a theoretical alternate project where no capacity constraints exists (i.e. incremental capacity methodology). It is deemed that this is the only method that satisfies the regulatory investment test under chapter 5 of the NER.
- The method used to determine primary/secondary trigger is based on the severity of need. This can be measure using a combination of financial difference, time criticalness and other measurable impacts. This is in line with how some DNSP evaluation their drivers.
- Ausgrid's Area Plans documentation outlines the approach and assumption made for the project estimates provided. The Area Plans are provided as part of the regulatory proposal.

The following are calculations requested by RIN 2.3.2 that is carried outside of the processes in the steps above:

- Since indirect costs (i.e. 'Indirect Labour' and 'Indirect Other') are embedded into the total labour cost of the forecast system, an allocation approach is used to separate the associated direct labour costs. It is deem that historical cost elements provide the most suitable basis for this allocation.
- Installation labour volume is determined using the indirect labour derived above and dividing it by the average unit rate of direct labour ($/man hour). It is deemed that this is a reasonable approach given the timeframe and practicality of carrying out detail resource requirement against each project.
- In principle, when an estimate cannot be provided, it is because any known attempt to create this data is baseless and potentially leads to further misunderstanding of the information sought in the notice.

The procedure to populate table 2.3.2 involved extensive manual analysis of information, as Ausgrid does not have any automated systems to generate this type of information. As this is the only method for Ausgrid to populate table 2.3.2, the information used is the best available.

Use of Estimated Information

Estimates were provided for the following reasons:

- The process to filter out the applicable projects above (Step 1) is by nature a theoretical estimation of the associated augmentation component. Naturally, this is not an issue for projects deem to be 100% augmentation.

- As a result of how the template is setup, there is no mean to provide sensible inputs without resorting to a primary/secondary trigger to select meaningful projects applicable for this table and meet the RIN requirements at the same time.
- Any expected forecast expenditure is by nature an estimate.
- Circuit KM Upgraded is simply not captured in any known system and cannot be readily determine as there are no sensible information that to use as point of reference.
- Specific expenditure regarding underground cables are not available in the corporate transaction systems as sub-transmission underground works are competitive tendered and the cable costs are typically embedded as part of the invoice deemed as contract services. As such no sensible estimate can be made as the procurement cost for material varies between service providers and is not typically privilege information.
- Although some Poles/Towers Added can be found within each project, it is proven that the asset counts in the system are inaccurate and not sensible compare to the actual Circuit KM Added. As such, it is more appropriate to provide an estimate using the actual Circuit KM Added and the average span distances between two common types of constructions.
- Expenditure in overhead feeder is split equally between Poles/Towers and Overhead Lines.

The conversion from actual dollars (nominal) to real dollars ($2012-13) is by nature an estimate.

Reliability of Information

Template - 2.3 Augex B

Table 2.3.3 - AUGEX DATA - HV/LV FEEDERS AND DISTRIBUTION SUBSTATIONS

Table 2.3.3.1 DESCRIPTOR METRICS

Table 2.3.3.2 COST METRICS

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

Source of Information

Information was obtained from Ausgrid's Corporate Information System (SAP), Distribution Planning Investigation (DPI), and Geographical Information System (GIS). SAP Business Intelligence standard reports were used as a basis for determining costs and project type. Asset volume and their nature have been sourced from DPI and GIS.

Since Ausgrid does not currently categorise Augmentation projects in the same way as the RIN, it was necessary to undertake an analysis of projects occurred in 2019/20. The asset volume reported includes only the projects that were completed in 2019/20, whereas the dollars reported includes all projects that incurred an expenditure in 2019/20.

Actual FY2020$ come from standard capex reports from SAP (Capex by LOB - Snapshot report) run by drivers (in this case are augmentation and reliability) and direct cost only.

Methodology & Assumptions

Table 2.3.3.1

Step 1. Produce a BI report by driver, Reg ID, WBS elements and financial asset category dimension format for 2019/20 with cost element and asset class breakdown. Only projects that were completed (practically) in FY2020 were included for the volume report.

Step 2. For feeders, circuit length data by network type (OH/UG) is obtained from Ausgrid's GIS database. For Distribution substation, volumes by type (Pole/Ground/Indoor) are obtained from Distribution Planning DPI database

Step 3 For feeders, the proportion of added and upgraded was determined by reviewing project justification documents. Where these were unavailable (some projects pre-date TRIM), the likely scope of work was determined based on engineering judgement (e.g .LV work to decommission a substation was assumed to be added LV to the location of the new replacement substation). For Distribution substation, the 'Added' or 'Upgrade' volumes are available in the DPI database.

Step 4. Projects with budget estimate of less than $50k have been excluded as they are reported as non-material projects. Work Orders that are recorded under Standing projects are also reported as non-material projects in FY2020. These are bucket projects with individual budget less than $50k.

Step 5. All projects related to STS, STSS, ZS/Subtransmission Lines are excluded since they are reported separately as part of major projects.

Table 2.3.3.2

Step 1. Produce a BI report by driver, Reg ID, WBS elements and financial asset category dimension format for 2019/20 with cost element and asset class breakdown. Actual expenditure in FY2020 of all projects are included, regardless of the project status.

Step 2. Map each WBS element capex spend into the required line item. This is done by engaging subject matter experts in combining each asset class and each project sub-category and eventually projects attached to it.

Step 3 Identify direct cost elements and follow the step by step mapping by Reg ID, Project Sub-category and Asset Class. Each project spending is reported into the required line items.

Step 4. Projects with budget estimate of less than $50k have been reported as non-material. LV Planning Investigation and LV load surveys projects are also identified as non-material. Work Orders that are recorded under Standing projects are also reported as non-material projects in FY2020. These are bucket projects with individual budget less than $50k.

Step 5. HV augmentations associated STS, STSS, ZS/Subtransmission were excluded, becaused they are reported in table 2.3.4 as subtransmission items.

Step 6. Allocate projects identified as support costs across each line item reported.

Assumptions:

- Asset counts filled in for RIN Table 2.3.3.1 include only projects and work orders that were PC/FC spell out in the last 12 months.
- Only certain types of work order include circuit added/upgraded, refer to Mapping table T4 for more details.

- The two LV programs "LV Load Survey" and "LV Planning and Investigations" are assigned to the nonMaterial line items in RIN Table 2.3.3.2.
- All Work orders are <$50k, and are assigned to the nonMaterial line items in RIN Table 2.3.3.2. Refer to Refinement in FY2020 for more details.
- There has been no Augex spent by Ausgrid on Land Purchases and Easements for Distribution asset (HV Feeders, LV Feeders, Distribution Substations) from FY17 to FY20. The only Land and Easement related expenditures were incurred by projects at the Subtransmission level. Ausgrid records these expenditures as one of the SUPP line item, which becomes part of the support costs that are proportionally allocated to the various RIN categories.

Use of Estimated Information

This is Actual

Reliability of Information

In FY2020, Ausgrid has developed an automated process for filling out Section 2.3Augex(b) of the Annual RIN by using a software called SAS.

This SAS program has been uploaded onto Rosetta with all the raw input data files, along with a step-by-step Work Instruction. (Note that the SAS software is required to be installed for running the SAS program.)

Table 2.3.4 - AUGEX DATA - TOTAL EXPENDITURE

Compliance with Requirements of the Notice

This response is based on the worksheets and supporting documentation as provided by the AER and as interpreted by the relevant completing Ausgrid business unit. The information primarily comes from Ausgrid's CIS system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

Source of Information

Information was obtained from Ausgrid's Corporate Information System (SAP), Distribution Planning Investigation (DPI), and Geographical Information System (GIS). SAP Business Intelligence standard reports were used as a basis for determining costs and project type. Asset volume and their nature have been sourced from DPI and GIS.

Since Ausgrid does not currently categorise Augmentation projects in the same way as the RIN, it was necessary to undertake an analysis of projects occurred in 2019/20. The asset volume reported includes only the projects that were completed in 2019/20, whereas the dollars reported includes all projects that incurred an expenditure in 2019/20.

Actual FY2020$ come from standard capex reports from SAP (Capex by LOB - Snapshot report) run by drivers (in this case are augmentation and reliability) and direct cost only.

Methodology & Assumptions

Step 1. Produce a BI report by driver, Reg ID, WBS elements and financial asset category dimension format for 2019/20 with cost element and asset class breakdown. Actual expenditure in FY2020 of all projects are included, regardless of the project status.

Step 2. Map each WBS element capex spend into the required line item. This is done by engaging subject matter experts in combining each asset class, each project sub-categary, each Reg ID and eventually projects attached to it.

As a general rule, all major projects are mapped to Subtransmission lines and STS/ STSS/ Zone substation RIN category. A few minor project components relating to street lighting, Distribution substation CSACS & SCADA are mapped to 'Other Asset category'. Remaining projects are mapped into HV Feeder, LV Feeder and Distribution Substations.

No material expenditure was incurred in land purchases and easement category.

Step 3 Identify direct cost elements and using the step by step mapping from Reg ID to Project Sub-category and Asset Class, each project spending is reported into the required line items.

Step 4. Allocate projects identified as support costs across each line item reported.

Section 2.3.4 reconciles to 2.3.3.2 for HV Feeders, LV Feeders and Distribution Substations as per below:

2.3.4	**2.3.3.2**
HV Feeders	HV Feeder Augmentations - Overhead Lines
	HV Feeder Augmentations - Underground Cables
	HV Feeder Non-Material Projects
LV Feeders	LV Feeder Augmentations - Overhead Lines
	LV Feeder Augmentations - Underground Cables
	LV Feeder Non-Material Projects
Distribution Substations	Distribution Substation Augmentations - Pole Mounted
	Distribution Substation Augmentations - Ground Mounted
	Distribution Substation Augmentations - Indoor

Assumptions:

- Asset counts filled in for RIN Table 2.3.3.1 include only projects and work orders that were PC/FC spell out in the last 12 months.
- Only certain types of work order include circuit added/upgraded, refer to Mapping table T4 for more details.
- The two LV programs "LV Load Survey" and "LV Planning and Investigations" are assigned to the nonMaterial line items in RIN Table 2.3.3.2.
- All Work orders are <$50k, and are assigned to the nonMaterial line items in RIN Table 2.3.3.2. Refer to Refinement in FY2020 for more details.
- There has been no Augex spent by Ausgrid on Land Purchases and Easements for Distribution asset (HV Feeders, LV Feeders, Distribution Substations) from FY17 to FY20. The only Land and Easement related expenditures were incurred by projects at the Subtransmission level.

Ausgrid records these expenditures as one of the SUPP line item, which becomes part of the support costs that are proportionally allocated to the various RIN categories.

Use of Estimated Information

This is Actual

Reliability of Information

In FY2020, Ausgrid has developed an automated process for filling out Section 2.3Augex(b) of the Annual RIN by using a software called SAS.

This SAS program has been uploaded onto Rosetta with all the raw input data files, along with a step-by-step Work Instruction. (Note that the SAS software is required to be installed for running the SAS program.)

Template - 2.5 Connections

Table 2.5.1 DESCRIPTOR METRICS

Compliance with Requirements of the Notice

This response is based on the same preparation of worksheets and supporting documentation used in the Reset RIN. The information at an aggregated level primarily comes from Ausgrid's Corporate systems (SAP or GIS) or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

Source of Information

All information for Section 2.5 of the RIN was obtained from Ausgrid's Corporate Information System (SAP). SAP Business Intelligence standard reports were used as a basis for determining costs and volumes of connections. Customer project numbers have been sourced from SAP and Business Intelligence reporting.

Since Ausgrid operates in a contestable environment, the connection volumes are provided to reflect the number of connections with capital expenditures from Ausgrid. These connections can be carried out by external ASP's (Accredited Service Providors) or carried out by Ausgrid as contestable connections. Ausgrid's connection expenditure primarily relates to non-contestable work identified as not appropriate for an external ASP to undertake the work on the basis of a risk assessment. In practice this primarily relates to the termination of connection cables within live substations and reimbursement of ASP's for ancillary augmentation work undertaken on behalf of Ausgrid as part of the connection project.

Since Ausgrid does not currently categorise connection projects in the same way as the RIN, it was necessary to undertake an analysis of projects and work orders that incurred an expenditure in 2019/20. The reported volume of projects is for completed projects only whereas the expenditure reported is for expenditure incurred in FY2020. As a result, the average cost (reported expenditure per unit of completed projects) may vary from the average cost of individual projects.

Analysis of work orders was also undertaken. The reported volume of work orders is for work orders that have not been previously reported only whereas the expenditure reported is for expenditure incurred in FY2020. As a result, the average cost (reported expenditure per unit of completed work orders) may vary from the average cost of individual projects.

Methodology & Assumptions

Since 2017, expenditure in this area has been impacted by a change in Ausgrid's Customer Connection Policy back in 2014/15 to comply with AER Connection Charge Guidelines. Under this policy, Ausgrid no

longer provides free-issue material for connection projects. This is outlined in Ausgrid's Connection Policy which has been provided as part of the regulatory proposal.

Following the policy change, an internal decision was made to no longer use projects as the method of capturing expenditure and details of minor non-contestable connection activity. Instead, these activities were captured as notifications/work orders. This resulted in a significant reduction in project volumes and a corresponding increase in connection activity undertaken as work orders. This impacted the reporting in 2017 which significantly under-reported the volume of simple connections but overstated the volume of distribution substation installations. Whilst the projects identified were substation installations, the majority of these connections were contestable projects funded by customers. The Ausgrid component of these projects was non-contestable work related to the connection of these substations to the Ausgrid network (i.e. termination of connections to live substations and ASP reimbursement of ancillary augmentation). This has been corrected since 2017/18 annual RIN.

In FY2020 Ausgrid implemented the use of a new project type (the "AN" project) in our SAP system that enhanced our ability to track ACS (Alternate Control Service) activity at more granular levels. Consequently, internal processes for aspects of Connections related Capex were simplified and the need for the related "SC" project type eliminated. Reimbursement to ASP are no longer recorded under individual "SC" projects, instead they are aggregately recorded under Standing projects SM-61416 and SM-61417. (There was zero expenditure under SM-61417 in FY2020).

Standard SAP project reports were analysed to obtain connection volume of projects completed in 2019/20 by examining their project sub-category (commercial, residential etc.), connection types (Underground or Overhead) and other attributes. Project completion status was determined based on their status as at 30 June 2020 (i.e. practically completed).

Standard SAP Business Intelligence reports were used as a basis for determining the volume of Distribution Centres (DC's) installed and the split of residential and commercial. A SAP Ratings report was utilised to determine the total MVA added to the network based on the substation numbers obtained from the SAP BI report. The Ratings report provided the rated kVA, which was in turn converted to MVA. In 2019/20, there were no DC connections funded by Ausgrid. This will likely be the trend going forward as Ausgrid no longer free-issue material for connection projects since the change of the Connection policy in 2014/15.

For High Voltage (HV) and Low Voltage (LV) network augmentation information for the net circuit km added, it is believed that the only "net circuit km added" funded by Ausgrid is the LV inter-connector(s) that link the existing LV network to the distribution substation(s) newly established by the customers. In most cases, Ausgrid asks the customer's ASP to instal these LV inter-connectors and reimburse the ASP. These expenditures of reimbursements are captures in the Standing project SM-61416. The length

(km) is calculated by dividing the LTD Contracted Services cost of the project by a Unit rate that was estimated by examining a group of sample Work Orders occurred in FY2020. The average unit rate of $236.5k/km was used as the base unit rate for FY2020. Any cable installed in association with a project which is still 'in construction' will be reported in future years. However the cost of HV and LV network augmentation was obtained from SAP BI report of the projects incurred cost in 2018/19 with the split based on the project sub-category field. The cost includes any projects which are still 'in construction'. The circuit length does not include the length of contributed or customer funded assets. This policy has changed and in future, LV interconnections will be funded by developers/customers.

The costs specific to different types of connection projects were extracted from SAP with the same approach of splitting connection subcategory and connection configuration types as the volumes. The Network Planning Costs were excluded and reported as Network Overhead in other RIN Sheets.

Ausgrid does not keep record of the Mean days to connect residential customer with LV single phase connection, as Ausgrid does not directly connect customer to our Network. LV customers are connected to our Network through the appointment of external Accredited Service Providers (ASP).

Ausgrid has no volume but some expenditure to report in some descriptor metrics, this misalignment is caused by the timing difference for volume and expenditure, as mentioned earlier the volume is from the projects completed in 2019/20 while the expenditure covered incomplete projects carried out in 2019/20.

Assumptions:

- All projects from the LOB snapshot report that are Customer Connection driven are included except line items that have prefix starting with ANS_ (Alternate Network Service), MET_ (Metering), PL_ (Public Lighting) and line items related to Network Planning.
- Connection volume includes only projects that were practically completed in the last 12 months.
- Connection volume includes only work orders that have not been previously reported.
- Work Orders with a public lighting (PL) as project classification are excluded from Work Orders connection volume calculation.
- The only "net circuit km added" funded by Ausgrid is the LV interconnector(s) that link the existing LV network to the distribution substation(s) newly established by the customers. The length (km) is estimated by dividing the LTD Contracted Services cost of the project by a Unit rate that was estimated by examining a group of sample Work Orders occurred in FY2020. The average unit rate of $236.5k/km was used as the base unit rate for FY2020.
- The values filled out for "Net circuit km added" and "Distribution substation installed" only include projects that were practically completed in the last 12 months and Work Orders that have not been previously reported.
- There are no Ausgrid funded Distribution Substation established under Work Orders.

- No Distribution substation transformer are funded by Ausgrid in projects that have incurred less than $50k in Material LTD expenditure.
- These four line items from RIN Table 2.5.1 have been reported with zeros in the last few years.

Mean days to connect residential customer with LV single phase connection
Volume of GSL breaches for residential customers
Volume of customer complaints relating to connection services
GSL payments

- For the first line item, all residential connections are carried out by ASP, which means Ausgrid in not directly invovled in connecting any single phase residential customer.
- For the other three line items, we are of the understanding that there is another section in the RIN that reports GSL related matters. These three line items are duplicated.

Use of Estimated Information

N/A

Reliability of Information

In FY2020, Ausgrid has developed an automated process for filling out Section 2.5 of the Annual RIN by using a statistical software package called SAS.

This SAS program has been uploaded onto Rosetta with all the raw input data files, along with a step-by-step Work Instruction. (Note that the SAS software is required to be installed for running the SAS program.

Table 2.5.2 COST METRICS BY CONNECTION CLASSIFICATION

Compliance with Requirements of the Notice

This response is based on the same preparation of worksheets and supporting documentation used in the Reset RIN. The information at an aggregated level primarily comes from Ausgrid's SAP system or is based on advice from the relevant business unit experts. Subject matter experts were engaged in preparing this information as necessary.

Source of Information

Table 2.5.2 shares the same data source with Table 2.5.1. The SAP Business Intelligence and SAP Analysis reports were used as a basis for determining expenditure associated with various connection subcategories.

Since Ausgrid operates in a contestable environment, the connection volumes are provided to reflect the number of connections with capital expenditures from Ausgrid. These connections can be carried out by external ASPs or carried out by Ausgrid as contestable connections. Ausgrid's connection expenditure primarily relates to works removed from contestability on the basis of a risk assessment which determines that it is not appropriate for an external ASP to undertake the work. In practice this primarily relates to the termination of connection cables within live substations and reimbursement of ASP's for ancillary augmentation work undertaken on behalf of Ausgrid as part of the connection project.

Connection figures for Table 2.5.2 were obtained from a detailed analysis of projects initiated by the Customer Connection driver. This was required because projects were not categorised in Ausgrid's systems in the same way as the AER's RIN categories.

The total volume and the expenditure of 2019/20 is obtained from SAP Business Intelligence and SAP Analysis then split by connection type by analysing the connection projects' category and subcategory.

As mentioned earlier under 2.5.1, the volume of this template is sourced from the connections projects completed in 2019/20 while the expenditure includes the expenditures of the projects completed as well as still under construction.

Analysis of work orders was also undertaken. The reported volume of work orders is for work orders that have not been previously reported only, whereas the expenditure reported is for expenditure incurred in FY2020.

As a result, the average cost (reported expenditure per unit of project/work order) may vary from the average cost of individual project/work order.

Methodology & Assumptions

The information was obtained from SAP. The SAP Business Intelligence and SAP Analysis reports were used as a basis for determining expenditure associated with various connection subcategories.

In FY2020 Ausgrid implemented a new project type (the "AN" project) in our SAP system that enhanced our ability to track ACS activity at more granular levels. Consequently, internal processes for aspects of Connections related Capex were simplified and the need for the related "SC" project type eliminated. Reimbursement to ASP are no longer recorded under individual "SC" projects, instead they are aggregately recorded under Standing projects SM-61416 and SM-61417. (There was zero expenditure under SM-61417 in FY2020).

Similar to Table 2.5.1, connection figures for Table 2.5.2 were obtained from a detailed analysis of projects' category and subcategories under the Customer Connection driver. This was required because projects were not categorised in Ausgrid's systems in the same way as the AER's RIN categories.

Ausgrid has no volume but some expenditure to report in some descriptor metrics. This misalignment is a result of the requirement to report completed project volumes only but report total expenditure for 2019/20.

Assumptions:

- All projects from the LOB snapshot report that are Customer Connection driven are included except line items that have prefix starting with ANS_, MET_, PL_, and line items related to Network Planning.
- Connection volume includes only projects that were practically completed in the last 12 months.
- Connection volume includes only work orders that have not been previously reported.
- Work Orders with a public lighting (SL) as project classification are excluded from Work Orders connection volume calculation.
- The only "net circuit km added" funded by Ausgrid is the LV interconnector(s) that link the existing LV network to the distribution substation(s) newly established by the customers. The length (km) is estimated by dividing the LTD Contracted Services cost of the project by a Unit rate that was estimated by examining a group of sample Work Orders occurred in FY2020. The average unit rate of $236.5k/km was used as the base unit rate for FY2020.
- The values filled out for "Net circuit km added" and "Distribution substation installed" only include projects that were practically completed in the last 12 months and Work Orders that have not been previously reported.
- There is no Ausgrid funded Distribution Substation established under Work Orders.

- No Distribution substation transformer is funded by Ausgrid in projects that have incurred less than $50k in Material LTD expenditure.
- These four line items from RIN Table 2.5.1 have been reported with zeros in the last few years.

Mean days to connect residential customer with LV single phase connection
Volume of GSL breaches for residential customers
Volume of customer complaints relating to connection services
GSL payments

- For the first line item, it is assumed that all residential connections are carried out by ASP, which means Ausgrid does not connect any single phase residential customer.
- For the other three line items, we are of the understanding that there is another section in the RIN that reports GSL related matters. These three line items are duplicated.

Use of Estimated Information

Reliability of Information

In FY2020, Ausgrid has developed an automated process for filling out Section 2.5 of the Annual RIN by using a software called SAS.

This SAS program has been uploaded onto Rosetta with all the raw input data files, along with a step-by-step Work Instruction. (Note that the SAS software is required to be installed for running the SAS program.)

Template - 2.6 Non Network

Table 2.6.1 - NON-NETWORK EXPENDITURE

Table CAPEX

Table OPEX

Compliance with Requirements of the Notice

Actual data for the period 2019/20 has been based on the extraction of actual financial data directly from our SAP financial system or via TM1. As such, the prevailing entries represent a subset of figures that have been reported in our annual audited financial statements and have been made in accordance with our CAM at the time of entry.

It should be noted that all costs shown exclude overhead and/or other costs that are not directly attributable to the non-network assets, as defined by the AER's RIN instructions. Furthermore, all financial data as it relates to IT & Communications, Property & Vehicle expenditure has been extracted via either TM1 or directly from SAP and represents a subset of the financial figures as reported in our annual audited financial statements, with any assumptions in respect of the basis for estimating the respective allocation between cost categories noted within the Basis of Preparation.

All the required categories of expenditure for Operating and Capital expenditure contained in tables 2.6.1, 2.6.2 and 2.6.3 have been completed.

Where there has been a variation to the above approach will be disclosed in the relevant sections below.

Source of Information

Actual data for the period 2019-20 has been based on the extraction of actual financial data directly from our SAP financial system or via TM1. Specific details of exact sources of information are shown in the below table:

Summary for Table 2.6.1 - Non-Network Expenditure

Expense Category	Source
IT & Communications Opex	SAP via TM1 data extraction and non-financial information noted below
IT & Communications Capex	SAP via BI data extraction and ICT project information

Motor Vehicles Opex	SAP via TM1 data extraction and non-financial information noted below
Motor Vehicles Capex	SAP via BI data extraction and non-financial information noted below
Building and Property Opex	SAP via TM1 data extraction
Building and Property Capex	SAP via BI extraction
Other Opex	Not applicable
Other Capex	SAP via BI extraction

Methodology & Assumptions

Actual Costs

Actual data for the period 2019/20 has been based on the extraction of actual financial data directly from our SAP financial system or via TM1. There is also a component of non-financial information involved in the preparation of the information.

All costs are shown exclusive of overhead and indirect cost allocations to provide a direct cost view.

Operating expenditure - Table 1

Expense Category	**Methodology**	**Assumptions**
Client Devices Opex	725040 - Desktop Support + 725090 - IT Hardware Leasing Expense	Client Devices Opex assumed to be the operating cost attached to the leasing and desktop support of PCs and other hand held devices. All other costs including software were included in recurrent/non-recurrent expenditure.
Recurrent Opex	All other Opex net of Client Devices and Non-Recurrent expenditure.	Recurrent Opex assumed to include expenditure that is recurrent in nature to support the ongoing ICT operations of the business (e.g. hardware/software maintenance,

		facilities management, application support, etc).
Non Recurrent Opex	ICT Opex analysed to determine non recurrent expenditures.	Non Recurrent Opex assumed to be work performed on projects that cannot be capitalised (e.g. preparation of business cases, minor reviews, minor enhancements to applications, work performed for various internal divisions that were not in direct support of an application, etc).
Car Opex	Total Number of Cars in Fleet (as per 2.6.3) divided by Total Fleet multiplied by NLOB Opex for Fleet.	Assumed that weighted average basis is an effective mechanism for splitting costs across vehicles. Ignores intricacies between vehicle types.
Light Commercial Vehicle (LCV) Opex	Total Number of LCV's in Fleet (as per 2.6.3) divided by Total Fleet multiplied by NLOB Opex for Fleet.	Assumed that weighted average basis is an effective mechanism for splitting costs across vehicles. Ignores intricacies between vehicle types.
Elevated Work Platform (EWP) LCV Opex	Total Number of EWP's LCV in Fleet (as per 2.6.3) divided by Total Fleet multiplied by NLOB Opex for Fleet.	Assumed that weighted average basis is an effective mechanism for splitting costs across vehicles. Ignores intricacies between vehicle types. Additionally, assumed all EWP's were in the HCV class.
Elevated Work Platform (EWP) HCV Opex	Total Number of EWP's HCV in Fleet (as per 2.6.3) divided by Total Fleet multiplied by NLOB Opex for Fleet.	Assumed that weighted average basis is an effective mechanism for splitting costs across vehicles. Ignores intricacies between vehicle types.
Heavy Commercial Vehicle	Total Number of HCV's in Fleet	Assumed that weighted average

(HCV) Opex	(as per 2.6.3) divided by Total Fleet multiplied by NLOB Opex for Fleet.	basis is an effective mechanism for splitting costs across vehicles. Ignores intricacies between vehicle types.
Buildings and Property Opex	Actual data for the period 2019/20 has been based on an extraction of actual financial data directly or via TM1 and the BI System reporting on information from our SAP financial system.	
Other Opex	No other Opex has been reported.	Based on the definition contained in Appendix F: Definitions, and a review of the Network Overhead and Corporate Overhead RIN categories, no Other Non-Network costs were identified per the table included in the Other Opex rationale table below.

Capital expenditure - Table 2

Expense Category	**Methodology**	**Assumptions**
Client Devices Capex	All ICT Project Capex - include only cost elements - 725160 - Hardware Purchases & 722100 - External Material - costs then analysed for Client Device expenditure only.	Client Devices Capex assumed to include hardware devices that access services made available by a server including desktop computers, laptops, thin client interfaces and handheld end user computing devices including smart phones, tablets and iPads.
Recurrent Capex	All ICT Capex project expenditure analysed to determine recurrent and non-recurrent expenditures.	Recurrent Capex assumed to include expenditure that is recurrent in nature to continually run the

		business and organically grow business operations (e.g. refresh/replacement of infrastructure, true-up of licences, application upgrades, enhancements, remediation, etc). Assumed all capex not performed by ICT to be recurring.
Non Recurrent Capex	All ICT Capex project expenditure analysed to determine recurrent and non-recurrent expenditures.	Non-Recurrent Capex assumed to be projects of a one-off and non-recurring nature. (e.g. new applications, new models, new developments, pilot projects, compliance requirements, migrations, etc).
Light Commercial Vehicle Capex	Capex data extracted directly from SAP BI from individual fleet projects and SAP GL.	This category includes plant procured during 2019/20.
Buildings and Property Capex	The numbers are obtained directly from the SAP financial system via BI.	
Non-Network Other expenditure (Fleet)	Capex data extracted directly from SAP BI	Assets as defined by the AER as Non Network Other expenditure including forklifts, trailers, mobile generators and mobile plant.

Motor Vehicle capital expenditure assumptions - Table 3

Circumstance	**Methodology**	**Reason for Estimate**
Car Capex	Total fleet capex spend related to cars in 2019/20.	N/A, actual data from SAP.
Light Commercial Vehicle Capex	Total fleet capex related to light commercial vehicles in 2019/20.	N/A, actual data from SAP.

	This includes plant purchased in 2019/20.	
Elevated Work Platform (EWP) HCV Capex	Total fleet capex for EWP's in 2019/20.	N/A, actual data from SAP.
Heavy Commercial Vehicle (HCV) Capex	Total fleet capex for HCV's in 2019/20.	N/A, actual data from SAP.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 2.6.2 - ANNUAL DESCRIPTOR METRICS - IT & COMMUNICATIONS EXPENDITURE

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of the RIN. The definition of IT & Communication "devices" and "user numbers" is consistent with the definitions in the RIN.

Source of Information

For employee numbers, actual data for 2019/20 has been used from SAP.

For user numbers and number of devices, actual data for 2019/20 has been used. These are based on the extraction of actual data from subsidiary systems (e.g. Active Directory) and spreadsheets used to track and record current ICT statistics and balances. (e.g. number of PC desktops & laptops).

Methodology & Assumptions

The number of employees engaged in standard control services is calculated based on work over the year scaled for time spent on standard control services work. This metric includes labour engaged under labour hire agreements.

Average number of employees excluding labour hire engaged in Standard Control Services work over FY 2019/20 was 2,504. Allocation to the Standard Control Services is based on FTE split of 87.0%. This aligns with Ausgrid's CAM.

Number of devices assumed to include hardware devices that access services made available by a server including desktop computers, laptops, thin client interfaces and handheld end user computing devices including smart phones, tablets and iPads. Number of users is the actual active employees reflected in our HR system as of 30 June 2020. The total number of devices and users has been allocated to Standard Control Services on the basis of the FTE split as per the CAM.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 2.6.3 - ANNUAL DESCRIPTOR METRICS - MOTOR VEHICLES 1

Compliance with Requirements of the Notice

Actual data for the period 2019/20 has been based on an extraction of actual financial data directly from our SAP financial system or via TM1. As such, the prevailing entries represent a subset of figures that have been reported in our annual audited financial statements and have been made in accordance with our CAM at the time of entry.

It should be noted that all costs shown exclude overhead and/or other costs that are not directly attributable to the non-network assets, as defined by the AER's RIN instructions. Furthermore, all financial data as it relates to IT & Communications, Property & Vehicle expenditure has been extracted via either TM1 or directly from SAP and represents a subset of the financial figures as reported in our annual audited financial statements, with any assumptions in respect of the basis for estimating the respective allocation between cost categories noted within the Basis of Preparation.

All the required categories of expenditure for Operating and Capital expenditure contained in tables 2.6.1, 2.6.2 and 2.6.3 have been completed. No further categories were considered material enough to be reported individually.

Where there has been a variation to the above approach it has been disclosed in the relevant sections below.

Source of Information

Non-financial information has been sourced from SAP being Ausgrid's fleet management system. Km Travelled data was extracted from SG Fleet's management system.

Methodology & Assumptions

Ausgrid has used data extracted from SAP system to align with the information requirements. The summary table is as follows:

ASSET CATEGORY	NUMBER
Car	192
Light commercial vehicle	1,402
Elevated work platform (LCV)	
Elevated work platform (HCV)	376

Heavy commercial vehicle		336
TOTAL		**2,306**
Descriptor Category	**Methodology**	**Assumptions**
Number of Leased and Owned Cars	Sedans + Wagons from SAP	Assumed all wagons and Sedans to be considered 'Cars'.
Car Allocation to Regulatory Expenditure	NLOB cube used for Opex and SAP BI NLOB for Capex.	NLOB is 95.2% Regulated and Capex split based on Corporate percentages for LOB splits.
Number of Leased and Owned LCVs	Vans/Utilities + Special Units + Light Cab Chassis from SAP.	Assumed all Vans, Utilities and Light Cab Chassis are LCVs.
LCV Allocation to Regulatory Expenditure	NLOB cube used for Opex and SAP BI NLOB for Capex.	NLOB is 95.2% Regulated and Capex split based on Corporate percentages for LOB splits.
Number of Leased and Owned EWP LCVs		Assumed all EWP's were considered HCVs.
Number of Leased and Owned EWP HCVs	EWP figures from SAP	All EWP categorised vehicles are considered EWP HCVs.
EWP HCV Allocation to Regulatory Expenditure	NLOB cube used for Opex and SAP BI NLOB for Capex.	NLOB is 95.2% Regulated and Capex split based on Corporate percentages for LOB splits.
Crane Borer HCV	Crane Borer and attached Trucks from SAP.	All Crane Borer categorised vehicles are considered Crane Borer HCVs.
Crane Borer HCV Allocation to Regulatroy Expenditure	NLOB cube used for Opex and SAP BI NLOB for Capex	NLOB is 95.2% Regulated and Capex split based on Corporate percentages for LOB splits.
Number of Leased and Owned HCVs	Trucks in SAP.	Assumed all Trucks are categorized as HCVs.

HCV Allocation to Regulatory Expenditure	NLOB cube used for Opex and SAP BI NLOB for Capex.	NLOB is 95.2% Regulated and Capex split based on Corporate percentages for LOB splits.

Assumptions:

N/A

Use of Estimated Information

Circumstance	Estimation Used	Reason for Estimate
Average Kilometres Travelled	KMs were assumed to be linked to the vehicle category of similar vehicle types in the system. This is due to a number of vehicles no longer being in the system. Where specific vehicle details were available these have been used.	Not all vehicle information is available in the system, hence the need for estimation.

Specific information per vehicle was not available for all kilometres, therefore where specific information was not available, an appropriate estimate of vehicle category based on similar vehicle types was used.

Reliability of Information

N/A

Table 2.6.3 - ANNUAL DESCRIPTOR METRICS - MOTOR VEHICLES 2

Compliance with Requirements of the Notice

Ausgrid has used data extracted from SAP to align with the information requirements.

Source of Information

Non-financial information has been sourced from SAP being Ausgrid's fleet management system. Kms Travelled data was extracted from SG Fleet's management system.

Methodology & Assumptions

N/A

Assumptions:

N/A

Use of Estimated Information

Ausgrid has used data extracted from SAP system & SG Fleet's management system to align with the information requirements.

Reliability of Information

N/A

Template - 2.7 Vegetation Management

Table 2.7.1 - DESCRIPTOR METRICS BY ZONE 1

Compliance with Requirements of the Notice

In reference to Worksheet 2.7 Vegetation Management, the information has been provided in line with the requirements provided by the AER in the RIN.

The information provided in Table 2.7.1 is consistent with the requirements in the RIN. In providing information on vegetation management metrics, Ausgrid has completed the table in accordance with section 13.8 - 13.10 of Appendix E of the RIN, and also relevant definitions.

In addition, Ausgrid has also provided the following, as required by section 10.15 of Schedule 1 and section 13.7 of Appendix E of the RIN:

- Provide compliance audits of vegetation management work conducted by Ausgrid during the current regulatory control period;
- A list of regulations that impose a material cost on performing *vegetation management* works (including, but is not limited to, bushfire mitigation regulations);
- A list of any of the self-imposed standards from Ausgrid's *vegetation management* program which apply to that zone; and
- An explanation of the cost impact of regulations and self-imposed standards on performing *vegetation management* work.

Source of Information

Because of the way Ausgrid has established its vegetation management contracts, the whole of Ausgrid's distribution network (supply area) has been considered as one (1) vegetation management zone for this submission.

Route length within zone and Number of maintenance spans

Route line length and number of spans was calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits; therefore significant manipulation of the existing data model was required and is documented in the Methodology section below.

To classify route lengths into feeder categories the above data was combined with the 2019 reliability feeder classifications. Ausgrid's Reliability Supply Quality & Ratings team performs an annual feeder re-

categorisation which is based on the loading and length of the feeder as per STPIS definitions. The feeder categorisation process is stored on HP Records Manager Record Number D16/350664. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible. It is dependent on the established definitions of the four feeder categories (CBD, Urban, Short Rural and Long Rural) as defined in the Licence Conditions (revised in July 14) Clause 19 and detailed below:

CBD Sydney Feeder - A feeder forming part of the triplex 11kv cable system supplying predominately commercial high-rise buildings, within the City of Sydney.

Urban Feeder - A feeder, which is not a CBD Sydney feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km.

Short Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length less than 200km.

Long Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length greater than 200km.

The feeder categories are updated and stored in TOAD which flows to the Business Objects reporting environment.

Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. For example feeder length varies as a result of network open point changes or augmentation, and feeder load can vary due to changes in demand from existing or new customers on the feeder - such as weather factors, customers installing PV, or an apartment building constructed where a house was. Therefore the annual feeder classification review is undertaken to determine each feeders appropriate feeder category, in line with our distribution licence conditions. Classification changes flow on to any other metrics based on those categories including the following sections of 2.7.1:

- Route line length,
- Number of maintenance spans,
- Total length of maintenance spans
- Length of Vegetation Corridors
- Average number of trees per maintenance span

The route line length used does not correspond to the AER's amended version to the definition emailed on Ausgrid on 7 April 2014. The amended definition in this email states that underground cables should

be included to the "route line length". The definition as outlined in this email was not adhered to for the calculations for Template 2.7 as underground cables are not relevant to vegetation management. Route line length has been calculated as per "Economic benchmarking RIN Instructions and Definitions.pdf".

"*The aggregate length in kilometres of lines, measured as the length of each span between poles and/or towers, and where the length of each span is considered only once irrespective of how many circuits it contains. This is the distance between line segments and does not include vertical components such as line sag."*

Total length of maintenance spans

Information on 'length of vegetation corridors' has been provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Length of vegetation corridors

Up to 2012/13 Information on 'length of vegetation corridors' was provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Average number of trees per maintenance span

GIS data. Route line maintenance spans combined with;

- 2019 reliability feeder classifications
- Ausgrid acquired 2019 Light Detection And Ranging (LiDAR)

Average frequency of cutting cycle

Information for 'average frequency of cutting cycles' has been estimated. This is discussed further in Methodology.

"Economic benchmarking RIN Instructions and Definitions.pdf" (page 50)

Methodology & Assumptions

Treatment of 'route length'

The route line length and number of spans is calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits. Consequently, modelling and estimation of the necessary RIN data is required.

In more detail:

To calculate the "Route line length" and "Number of maintenance spans", Ausgrid has spatially modelled the GIS data using the following methodology:

- The circuit data is split into individual line segments at every pole
- Where line segments run parallel, they 'snapped' together and treated as one, and
- Where a span has multiple circuits with different feeder classifications (eg.Rural, Urban, or CBD), the highest voltage classification is attributed to the span.

If a span has multiple circuits with multiple feeder classifications but all at the same voltage, the span is singularly classified in the priority order as below but retaining the highest priority;

A. CBD

B. Urban

C. Rural

Ausgrid does not give Transmission feeders (feeders >22kV) a feeder classification of CBD, Urban or Rural. A transmission feeder typically supplies multiple HV feeder classifications. As a consequence, spans made up of transmission only feeders are not assigned a CBD, Urban or Rural category. If a span only consists of transmission, it received a classification of Transmission however, if there was also a feeder of lesser voltage on the span, the transmission voltage was ignored and the classification of the lower voltage was applied.

The RIN templates only shows spans associated with low voltage and high voltage mains. Transmission only spans were not included in the RIN template.

The RIN templates were unable to be edited therefore the transmission results have been provided below;

- Transmission vegetation maintenance spans (number of spans)

A. 2009/10 17970

B. 2010/11 18419

C. 2011/12 18386

D. 2012/13 18468

E. 2013/14 17165

F. 2014/15 17564

G. 2015/16 17544

H. 2016/17 16985

I. 2017/18 16494

J. 2018/19 16245

K. 2019/20 16228

Variances between YOY values can be attributed to the Feeder classification process (explained previously). In FY19 there was an increase in the number of Rural maintenance spans (2016-17 243103, 2017-18 222048, 2018-19 254319, 2019-20 268537) due to more feeders being categorised as Rural.

In FY18 there were some Licence Condition changes which resulted in some single customer feeders that Ausgrid previously classified as "HV Customer", being classified as one of the standard four (4) classifications. This accounts for some of the increase shown in Urban metrics as feeders previously classified as HV Customers are now classified as Urban.

Services Mains lengths are an arbitrary length of 10m towards the centre of the supplied land parcel; therefore they have been excluded as a calculated length. In parts of Ausgrid's network the Service Mains (Service Mains - The low voltage overhead mains belonging to the company between the company's Distribution Mains and the Point of Supply. Point of Supply - The point of delineation i.e. junction between the company owned overhead mains and the Consumer's Mains) span is subject to vegetation management practises and it has been counted as a span. The decrease in the total number of spans between 2013/14 and 2014/15 is due to a data quality improvement project to accurately identify Service Mains and Consumer Mains in Ausgrid's GIS. Due to the source data structure used to calculate the feeder classifications, street lighting data was not able to be assigned a classification and therefore omitted from the feeder category split results. For this reason and the omission of the Transmission only spans, the sum of the "Urban and CBD" and "Rural" number of maintenance spans will not equal the total number of maintenance spans. The increase in number of maintenance spans is accounted for the increased scope of vegetation managed service spans in 2016/17. In previous years, the number of vegetation service spans has been limited to discrete geographic areas, but has since been expanded to include all service spans in the Ausgrid network.

Treatment of 'maintenance spans'

Data for the 'total length of maintenance spans' is provided on the same basis as "Route length within zone". All Ausgrid's overhead mains network is subject to vegetation management practices to ensure adequate safety clearances are maintained.

Treatment of 'Length of vegetation corridors'

The RIN data for 2019/20 is estimated and based on 2012/13 actual data. Ausgrid does not formally capture this data. It has been assumed that all of the vegetation corridors are associated with 'rural' feeders. The 2019/20 data is estimated by applying a 5% growth factor since FY 13/14.

Treatment of 'average number of trees per maintenance span'

The average number of trees per span is modelled on Ausgrid's GIS data but takes into account feeder classifications and Light Detection and Ranging (LIDAR) technology. The data is estimated.

Ausgrid utilised LiDAR acquired data for 2013, 2014, 2015,2016,2017, 2018 and 2019 to calculate vegetation within the vicinity of its network covered by vegetation management activities. The spread or coverage of the LiDAR data and tree identification was within the LiDAR swath width which was up to 8 meters from the network. Trees and vegetation outside of this corridor were ignored and deemed not to be within the vicinity of the network for vegetation management activities.

The LiDAR data acquired by Ausgrid does not identify individual trees, however the data extracted from the point cloud data, acquired in 2015, 2016, 2017, 2018, 2019 identifies areas or canopies of vegetation. These areas are more representative of tree branches and canopies than individual trees therefore, these individual segments have been amalgamated together based on a 3-metre radius and counted as one tree. The detail of this data has been improved and is therefore more refined than previous years.

To increase the sample data for the 2019 average number of trees and therefore reporting accuracy; data coverage from the 2019 LiDAR acquisition has been combined with previous years areas where omitted from the 2019 acquisition

areas. The resulting percentage of network covered by Lidar for 2019 is displayed in Table 3.7.2.3 below. Note that this was not used to calculate the average number of defects; average number of defects only used the 2019 LiDAR data.

Feeder Classification	**2019**
Transmission	87%
Rural	93%
Urban/CBD	40%

Table 3.7.2.3 - Sample Data Representation of Total Network

The AER has requested the defects and trees be categorised by feeder classification, however Transmission feeders (feeders > 22kV) do not have a feeder classification of CBD, Urban, or Rural. A transmission feeder typically supplies multiple feeders with different classifications. As a consequence, spans which are transmission only feeders are not assigned a CBD, Urban, or Rural category. If a span only consisted of transmission it received a classification of transmission, and therefore the defect and trees along the same span received the same classification. If there was also a conductor of lesser voltage in the span, transmission voltage was ignored and the classification of the lower voltage was applied to the span, associated defects, and trees.

The RIN templates only accommodate the reporting of trees and defects associated with low voltage and high voltage mains, therefore Transmission only trees and defects were not included in the RIN Template. The transmission defect and tree quantities are as follows

Average Number of Trees Near Transmission Only Spans	
Year	**Trees**
2011/12	0.34
2012/13	0.30
2013/14	0.30
2014/15	2.07
2015/16	3.143
2016/17	3.165
2017/18	2.919
2018/19	2.925
2019/20	2.641

All of the overhead network is subject to vegetation management practises to ensure adequate clearances are maintained.

The Average number of trees per Urban and CBD vegetation Maintenance Span and the Average number of trees per Rural Vegetation maintenance span in the financial year 2016-17 and 2017-18, was rounded to a whole number. Since then the data entered is the unrounded value(s).

Treatment of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this a review cycle of 1 year is assumed.

Assumptions:

Transmission Feeders (Voltage >22kV)

Ausgrid does not give Transmission feeders a feeder classification of CBD, Urban nor Rural. A transmission feeder typically supplies multiple HV feeder classifications. If a span only consists of transmission, it receives a classification of Transmission however, if there is a feeder of lesser voltage on the span, the transmission voltage is ignored and the classification of the lower voltage is applied.

The RIN templates only provide for spans associated with low voltage and high voltage mains and as such Ausgrid has not provided transmission data in this table.
For the FY17-18 period the transmission vegetation maintenance spans are 16,245

Length of vegetation corridors[EM1]

Based on the new overheard line construction work that has occurred over the past years, a 5% increase from 2008/09 up to the 2012/13 figure has been assumed.

Average number of trees per maintenance span

For 2008/09 to 2010/11 an average of 2011/12 to 2012/13 data was used.

Average frequency of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this we have assumed a review cycle of 1 year.

Use of Estimated Information

The data is estimated and the explanation is within the Methodology

Reliability of Information

Table 2.7.1 - DESCRIPTOR METRICS BY ZONE 2

Compliance with Requirements of the Notice

In reference to Worksheet 2.7 Vegetation Management (Rural Zones) , the information has been provided in line with the requirements provided by the AER in the RIN.

The information provided in Table 2.7.1 is consistent with the requirements in the RIN. In providing information on vegetation management metrics, Ausgrid has completed the table in accordance with Section 10.15 of Schedule 1 and section 13.7 - 13.10 of Appendix E of the RIN, and also relevant definitions.

Source of Information

Because of the way Ausgrid has established its vegetation management contracts, the whole of Ausgrid's distribution network (supply area) has been considered as one (1) vegetation management zone for this submission.

Route length within zone and Number of maintenance spans

Route line length and number of spans was calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits; therefore significant manipulation of the existing data model was required and is documented in the Methodology section below.

To classify route lengths into feeder categories the above data was combined with the 2019 reliability feeder classifications. Ausgrid's Reliability Supply Quality & Ratings team performs an annual feeder re-categorisation which is based on the loading and length of the feeder as per STPIS definitions. The feeder categorisation process is stored on HP Records Manager Record Number D16/350664. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible. It is dependent on the established definitions of the four feeder categories (CBD, Urban, Short Rural and Long Rural) as defined in the Licence Conditions (revised in July 14) Clause 19 and detailed below:

CBD Sydney Feeder - A feeder forming part of the triplex 11kv cable system supplying predominately commercial high-rise buildings, within the City of Sydney.

Urban Feeder - A feeder, which is not a CBD Sydney feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km.

Short Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length less than 200km.

Long Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length greater than 200km.

The feeder categories are updated and stored in TOAD which flows to the Business Objects reporting environment.

Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. For example feeder length varies as a result of network open point changes or augmentation, and feeder load can vary due to changes in demand from existing or new customers on the feeder - such as weather factors, customers installing PV, or an apartment building constructed where a house was. Therefore the annual feeder classification review is undertaken to determine each feeders appropriate feeder category, in line with our distribution licence conditions. Classification changes flow on to any other metrics based on those categories including the following sections of 2.7.1:

- Route line length,
- Number of maintenance spans,
- Total length of maintenance spans
- Length of Vegetation Corridors
- Average number of trees per maintenance span

The route line length used does not correspond to the AER's amended version to the definition emailed on Ausgrid on 7 April 2014. The amended definition in this email states that underground cables should be included to the "route line length". The definition as outlined in this email was not adhered to for the calculations for Template 2.7 as underground cables are not relevant to vegetation management. Route line length has been calculated as per "Economic benchmarking RIN Instructions and Definitions.pdf".

"*The aggregate length in kilometres of lines, measured as the length of each span between poles and/or towers, and where the length of each span is considered only once irrespective of how many circuits it contains. This is the distance between line segments and does not include vertical components such as line sag."*

"Economic benchmarking RIN Instructions and Definitions.pdf" (page 50)

Because of the way Ausgrid has established its vegetation management contracts, the whole of Ausgrid's distribution network (supply area) has been considered as one (1) vegetation management zone for this submission.

Route length within zone and Number of maintenance spans

Route line length and number of spans was calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits; therefore significant manipulation of the existing data model was required and is documented in the Methodology section below.

To classify route lengths into feeder categories the above data was combined with the 2019 reliability feeder classifications. Ausgrid's Reliability Supply Quality & Ratings team performs an annual feeder re-categorisation which is based on the loading and length of the feeder as per STPIS definitions. The feeder categorisation process is stored on HP Records Manager Record Number D16/350664. The annual review process is undertaken prior to the commencement of each financial year, to ensure feeder classifications are as accurate as possible. It is dependent on the established definitions of the four feeder categories (CBD, Urban, Short Rural and Long Rural) as defined in the Licence Conditions (revised in July 14) Clause 19 and detailed below:

CBD Sydney Feeder - A feeder forming part of the triplex 11kv cable system supplying predominately commercial high-rise buildings, within the City of Sydney.

Urban Feeder - A feeder, which is not a CBD Sydney feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km.

Short Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length less than 200km.

Long Rural Feeder - A feeder which is not a CBD Sydney feeder or Urban feeder with total feeder route length greater than 200km.

The feeder categories are updated and stored in TOAD which flows to the Business Objects reporting environment.

Changes in feeder categories occur every year. This is because the two key inputs for classification - feeder length and demand - continue to vary over time. For example feeder length varies as a result of network open point changes or augmentation, and feeder load can vary due to changes in demand from existing or new customers on the feeder - such as weather factors, customers installing PV, or an apartment building constructed where a house was. Therefore the annual feeder classification review is undertaken to determine each feeders appropriate feeder category, in line with our distribution licence conditions. Classification changes flow on to any other metrics based on those categories including the following sections of 2.7.1:

- Route line length,
- Number of maintenance spans,

- Total length of maintenance spans
- Length of Vegetation Corridors
- Average number of trees per maintenance span

The route line length used does not correspond to the AER's amended version to the definition emailed on Ausgrid on 7 April 2014. The amended definition in this email states that underground cables should be included to the "route line length". The definition as outlined in this email was not adhered to for the calculations for Template 2.7 as underground cables are not relevant to vegetation management. Route line length has been calculated as per "Economic benchmarking RIN Instructions and Definitions.pdf".

"*The aggregate length in kilometres of lines, measured as the length of each span between poles and/or towers, and where the length of each span is considered only once irrespective of how many circuits it contains. This is the distance between line segments and does not include vertical components such as line sag."*

"Economic benchmarking RIN Instructions and Definitions.pdf" (page 50)

Total length of maintenance spans

Information on 'length of vegetation corridors' has been provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Length of vegetation corridors

Up to 2012/13 Information on 'length of vegetation corridors' was provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Average number of trees per maintenance span

GIS data. Route line maintenance spans combined with;

- 2019 reliability feeder classifications
- Ausgrid acquired 2019 Light Detection And Ranging (LiDAR)

Average frequency of cutting cycle

Information for 'average frequency of cutting cycles' has been estimated. This is discussed further in Methodology.

Total length of maintenance spans

Information on 'length of vegetation corridors' has been provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Length of vegetation corridors

Up to 2012/13 Information on 'length of vegetation corridors' was provided by the vegetation management contractors through their contractor data capture. Only current data could be obtained and was used for 2012/13. All other years (FY18 Inclusive) have been estimated.

Average number of trees per maintenance span

GIS data. Route line maintenance spans combined with;

- 2019 reliability feeder classifications
- Ausgrid acquired 2019 Light Detection And Ranging (LiDAR)

Average frequency of cutting cycle

Information for 'average frequency of cutting cycles' has been estimated. This is discussed further in Methodology.

Methodology & Assumptions

Treatment of 'route length'

The route line length and number of spans is calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits. Consequently, modelling and estimation of the necessary RIN data is required.

In more detail:

To calculate the "Route line length" and "Number of maintenance spans", Ausgrid has spatially modelled the GIS data using the following methodology:

- The circuit data is split into individual line segments at every pole
- Where line segments run parallel, they 'snapped' together and treated as one, and
- Where a span has multiple circuits with different feeder classifications (eg.Rural, Urban, or CBD), the highest voltage classification is attributed to the span.

If a span has multiple circuits with multiple feeder classifications but all at the same voltage, the span is singularly classified in the priority order as below but retaining the highest priority;

D. CBD

E. Urban

F. Rural

Ausgrid does not give Transmission feeders (feeders >22kV) a feeder classification of CBD, Urban or Rural. A transmission feeder typically supplies multiple HV feeder classifications. As a consequence, spans made up of transmission only feeders are not assigned a CBD, Urban or Rural category. If a span only consists of transmission, it received a classification of Transmission however, if there was also a feeder of lesser voltage on the span, the transmission voltage was ignored and the classification of the lower voltage was applied.

The RIN templates only shows spans associated with low voltage and high voltage mains. Transmission only spans were not included in the RIN template.

The RIN templates were unable to be edited therefore the transmission results have been provided below;

Treatment of 'route length'

The route line length and number of spans is calculated using Ausgrid's Geographical Information System (GIS) data. Ausgrid's GIS data is not represented as spans or singular routes, but represents the network as individual circuits. Consequently, modelling and estimation of the necessary RIN data is required.

In more detail:

To calculate the "Route line length" and "Number of maintenance spans", Ausgrid has spatially modelled the GIS data using the following methodology:

- The circuit data is split into individual line segments at every pole
- Where line segments run parallel, they 'snapped' together and treated as one, and
- Where a span has multiple circuits with different feeder classifications (eg.Rural, Urban, or CBD), the highest voltage classification is attributed to the span.

If a span has multiple circuits with multiple feeder classifications but all at the same voltage, the span is singularly classified in the priority order as below but retaining the highest priority;

A. CBD

B. Urban

C. Rural

Ausgrid does not give Transmission feeders (feeders >22kV) a feeder classification of CBD, Urban or Rural. A transmission feeder typically supplies multiple HV feeder classifications. As a consequence, spans made up of transmission only feeders are not assigned a CBD, Urban or Rural category. If a span only consists of transmission, it received a classification of Transmission however, if there was also a feeder of lesser voltage on the span, the transmission voltage was ignored and the classification of the lower voltage was applied.

The RIN templates only shows spans associated with low voltage and high voltage mains. Transmission only spans were not included in the RIN template.

The RIN templates were unable to be edited therefore the transmission results have been provided below;

- Transmission vegetation maintenance spans (number of spans)

A. 2009/10 17970

B. 2010/11 18419

C. 2011/12 18386

D. 2012/13 18468

E. 2013/14 17165

F. 2014/15 17564

G. 2015/16 17544

H. 2016/17 16985

I. 2017/18 16494

J. 2018/19 16245

K. 2019/20 16228

Variances between YOY values can be attributed to the Feeder classification process (explained previously). In FY19 there was an increase in the number of Rural maintenance spans (2016-17 243103, 2017-18 222048, 2018-19 254319, 2019-20 268537) due to more feeders being categorised as Rural.

In FY18 there were some Licence Condition changes which resulted in some single customer feeders that Ausgrid previously classified as "HV Customer", being classified as one of the standard four (4)

classifications. This accounts for some of the increase shown in Urban metrics as feeders previously classified as HV Customers are now classified as Urban.

Services Mains lengths are an arbitrary length of 10m towards the centre of the supplied land parcel; therefore they have been excluded as a calculated length. In parts of Ausgrid's network the Service Mains (Service Mains - The low voltage overhead mains belonging to the company between the company's Distribution Mains and the Point of Supply. Point of Supply - The point of delineation i.e. junction between the company owned overhead mains and the Consumer's Mains) span is subject to vegetation management practises and it has been counted as a span. The decrease in the total number of spans between 2013/14 and 2014/15 is due to a data quality improvement project to accurately identify Service Mains and Consumer Mains in Ausgrid's GIS. Due to the source data structure used to calculate the feeder classifications, street lighting data was not able to be assigned a classification and therefore omitted from the feeder category split results. For this reason and the omission of the Transmission only spans, the sum of the "Urban and CBD" and "Rural" number of maintenance spans will not equal the total number of maintenance spans. The increase in number of maintenance spans is accounted for the increased scope of vegetation managed service spans in 2016/17. In previous years, the number of vegetation service spans has been limited to discrete geographic areas, but has since been expanded to include all service spans in the Ausgrid network.

Treatment of 'maintenance spans'

Data for the 'total length of maintenance spans' is provided on the same basis as "Route length within zone". All Ausgrid's overhead mains network is subject to vegetation management practices to ensure adequate safety clearances are maintained.

Treatment of 'Length of vegetation corridors'

The RIN data for 2019/20 is estimated and based on 2012/13 actual data. Ausgrid does not formally capture this data. It has been assumed that all of the vegetation corridors are associated with 'rural' feeders. The 2019/20 data is estimated by applying a 5% growth factor since FY 13/14.

Treatment of 'average number of trees per maintenance span'

The average number of trees per span is modelled on Ausgrid's GIS data but takes into account feeder classifications and Light Detection and Ranging (LIDAR) technology. The data is estimated.

Ausgrid utilised LiDAR acquired data for 2013, 2014, 2015,2016,2017, 2018 and 2019 to calculate vegetation within the vicinity of its network covered by vegetation management activities. The spread or coverage of the LiDAR data and tree identification was within the LiDAR swath width which was up to 8 meters from the network. Trees and vegetation outside of this corridor were ignored and deemed not to be within the vicinity of the network for vegetation management activities.

The LiDAR data acquired by Ausgrid does not identify individual trees, however the data extracted from the point cloud data, acquired in 2015, 2016, 2017, 2018, 2019 identifies areas or canopies of vegetation. These areas are more representative of tree branches and canopies than individual trees therefore, these individual segments have been amalgamated together based on a 3-metre radius and counted as one tree. The detail of this data has been improved and is therefore more refined than previous years.

To increase the sample data for the 2019 average number of trees and therefore reporting accuracy; data coverage from the 2019 LiDAR acquisition has been combined with previous years areas where omitted from the 2019 acquisition

- Transmission vegetation maintenance spans (number of spans)

A. 2009/10 17970

B. 2010/11 18419

C. 2011/12 18386

D. 2012/13 18468

E. 2013/14 17165

F. 2014/15 17564

G. 2015/16 17544

H. 2016/17 16985

I. 2017/18 16494

J. 2018/19 16245

K. 2019/20 16228

Variances between YOY values can be attributed to the Feeder classification process (explained previously). In FY19 there was an increase in the number of Rural maintenance spans (2016-17 243103, 2017-18 222048, 2018-19 254319, 2019-20 268537) due to more feeders being categorised as Rural.

In FY18 there were some Licence Condition changes which resulted in some single customer feeders that Ausgrid previously classified as "HV Customer", being classified as one of the standard four (4) classifications. This accounts for some of the increase shown in Urban metrics as feeders previously classified as HV Customers are now classified as Urban.

Services Mains lengths are an arbitrary length of 10m towards the centre of the supplied land parcel; therefore they have been excluded as a calculated length. In parts of Ausgrid's network the Service Mains (Service Mains - The low voltage overhead mains belonging to the company between the company's Distribution Mains and the Point of Supply. Point of Supply - The point of delineation i.e. junction between the company owned overhead mains and the Consumer's Mains) span is subject to vegetation management practises and it has been counted as a span. The decrease in the total number of spans between 2013/14 and 2014/15 is due to a data quality improvement project to accurately identify Service Mains and Consumer Mains in Ausgrid's GIS. Due to the source data structure used to calculate the feeder classifications, street lighting data was not able to be assigned a classification and therefore omitted from the feeder category split results. For this reason and the omission of the Transmission only spans, the sum of the "Urban and CBD" and "Rural" number of maintenance spans will not equal the total number of maintenance spans. The increase in number of maintenance spans is accounted for the increased scope of vegetation managed service spans in 2016/17. In previous years, the number of vegetation service spans has been limited to discrete geographic areas, but has since been expanded to include all service spans in the Ausgrid network.

Treatment of 'maintenance spans'

Data for the 'total length of maintenance spans' is provided on the same basis as "Route length within zone". All Ausgrid's overhead mains network is subject to vegetation management practices to ensure adequate safety clearances are maintained.

Treatment of 'Length of vegetation corridors'

The RIN data for 2019/20 is estimated and based on 2012/13 actual data. Ausgrid does not formally capture this data. It has been assumed that all of the vegetation corridors are associated with 'rural' feeders. The 2019/20 data is estimated by applying a 5% growth factor since FY 13/14.

Treatment of 'average number of trees per maintenance span'

The average number of trees per span is modelled on Ausgrid's GIS data but takes into account feeder classifications and Light Detection and Ranging (LIDAR) technology. The data is estimated.

Ausgrid utilised LiDAR acquired data for 2013, 2014, 2015,2016,2017, 2018 and 2019 to calculate vegetation within the vicinity of its network covered by vegetation management activities. The spread or coverage of the LiDAR data and tree identification was within the LiDAR swath width which was up to 8 meters from the network. Trees and vegetation outside of this corridor were ignored and deemed not to be within the vicinity of the network for vegetation management activities.

The LiDAR data acquired by Ausgrid does not identify individual trees, however the data extracted from the point cloud data, acquired in 2015, 2016, 2017, 2018, 2019 identifies areas or canopies of

vegetation. These areas are more representative of tree branches and canopies than individual trees therefore, these individual segments have been amalgamated together based on a 3-metre radius and counted as one tree. The detail of this data has been improved and is therefore more refined than previous years.

To increase the sample data for the 2019 average number of trees and therefore reporting accuracy; data coverage from the 2019 LiDAR acquisition has been combined with previous years areas where omitted from the 2019 acquisition

areas. The resulting percentage of network covered by Lidar for 2019 is displayed in Table 3.7.2.3 below. Note that this was not used to calculate the average number of defects; average number of defects only used the 2019 LiDAR data.

Sample Data Representation of Total Network		
Feeder Classification	**2019**	
Transmission	87%	
Rural	93%	
Urban/CBD	40%	

Table 3.7.2.3 *- Sample Data Representation of Total Network*

The AER has requested the defects and trees be categorised by feeder classification, however Transmission feeders (feeders > 22kV) do not have a feeder classification of CBD, Urban, or Rural. A transmission feeder typically supplies multiple feeders with different classifications. As a consequence, spans which are transmission only feeders are not assigned a CBD, Urban, or Rural category. If a span only consisted of transmission it received a classification of transmission, and therefore the defect and trees along the same span received the same classification. If there was also a conductor of lesser voltage in the span, transmission voltage was ignored and the classification of the lower voltage was applied to the span, associated defects, and trees.

The RIN templates only accommodate the reporting of trees and defects associated with low voltage and high voltage mains, therefore Transmission only trees and defects were not included in the RIN Template. The transmission defect and tree quantities are as follows

Average Number of Trees Near Transmission Only Spans	
Year	**Trees**
2011/12	0.34
2012/13	0.30
2013/14	0.30
2014/15	2.07
2015/16	3.143
2016/17	3.165
2017/18	2.919
2018/19	2.925
2019/20	2.641

All of the overhead network is subject to vegetation management practises to ensure adequate clearances are maintained.

The Average number of trees per Urban and CBD vegetation Maintenance Span and the Average number of trees per Rural Vegetation maintenance span in the financial year 2016-17 and 2017-18, was rounded to a whole number. Since then the data entered is the unrounded value(s).

Treatment of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this a review cycle of 1 year is assumed.

areas. The resulting percentage of network covered by Lidar for 2019 is displayed in Table 3.7.2.3 below. Note that this was not used to calculate the average number of defects; average number of defects only used the 2019 LiDAR data.

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The RIN templates only accommodate the reporting of trees and defects associated with low voltage and high voltage mains, therefore Transmission only trees and defects were not included in the RIN Template. The transmission defect and tree quantities are as follows

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2013/14	0.30
2014/15	2.07
2015/16	3.143
2016/17	3.165
2017/18	2.919

2018/19	2.925
2019/20	2.641

All of the overhead network is subject to vegetation management practises to ensure adequate clearances are maintained.

The Average number of trees per Urban and CBD vegetation Maintenance Span and the Average number of trees per Rural Vegetation maintenance span in the financial year 2016-17 and 2017-18, was rounded to a whole number. Since then the data entered is the unrounded value(s).

Treatment of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this a review cycle of 1 year is assumed.

Assumptions:

Transmission Feeders (Voltage >22kV)

Ausgrid does not give Transmission feeders a feeder classification of CBD, Urban nor Rural. A transmission feeder typically supplies multiple HV feeder classifications. If a span only consists of transmission, it receives a classification of Transmission however, if there is a feeder of lesser voltage on the span, the transmission voltage is ignored and the classification of the lower voltage is applied.

The RIN templates only provide for spans associated with low voltage and high voltage mains and as such Ausgrid has not provided transmission data in this table.
For the FY17-18 period the transmission vegetation maintenance spans are 16,245

Length of vegetation corridors[EM1]

Based on the new overheard line construction work that has occurred over the past years, a 5% increase from 2008/09 up to the 2012/13 figure has been assumed.

Average number of trees per maintenance span

For 2008/09 to 2010/11 an average of 2011/12 to 2012/13 data was used.

Average frequency of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this we have assumed a review cycle of 1 year.

Transmission Feeders (Voltage >22kV)

Ausgrid does not give Transmission feeders a feeder classification of CBD, Urban nor Rural. A transmission feeder typically supplies multiple HV feeder classifications. If a span only consists of transmission, it receives a classification of Transmission however, if there is a feeder of lesser voltage on the span, the transmission voltage is ignored and the classification of the lower voltage is applied.

The RIN templates only provide for spans associated with low voltage and high voltage mains and as such Ausgrid has not provided transmission data in this table.
For the FY17-18 period the transmission vegetation maintenance spans are 16,245

Length of vegetation corridors[EM1]

Based on the new overheard line construction work that has occurred over the past years, a 5% increase from 2008/09 up to the 2012/13 figure has been assumed.

Average number of trees per maintenance span

For 2008/09 to 2010/11 an average of 2011/12 to 2012/13 data was used.

Average frequency of cutting cycle

There is no clause or requirement in Ausgrid vegetation management contracts to carry out vegetation maintenance activities in a cyclic manner. Because of this we have assumed a review cycle of 1 year.

Use of Estimated Information

The data is estimated and the explanation is within the Methodology

Reliability of Information

Table 2.7.2 - EXPENDITURE METRICS BY ZONE

Compliance with Requirements of the Notice

The information provided in Table 2.7.2 is consistent with the requirements in the RIN. In providing information on vegetation management metrics, Ausgrid has completed the table in accordance with the relevant requirements of section 13 of Appendix E of the RIN, and also relevant definitions.

In particular, Ausgrid has provided an explanation of the expenditures that have been included in Table 2.7.2, as per section 13.15 of Appendix E of the RIN.

Source of Information

Vegetation management costs

The figures shown have been extracted from Ausgrid's corporate asset management system (SAP) and financial system (TM1), using established work orders for capturing the costs associated with vegetation management

Methodology & Assumptions

Tree trimming costs

Tree trimming costs are the total direct contracted services costs associated with the current vegetation management contracts excluding ground clearance, veg corridor clearance & Inspection Costs.

Assumptions have been made to determine the percentage of expenditure allocated to each sub-category. This is further explained below. The methodology used in providing this data is explained below.

Other vegetation management costs

As stated in Section 2.4 (c) above, this figure is a combination of direct material costs, direct other costs and the direct internal labour costs associated with "gaining access" ("outage costs") to the network (Operators - switching and Lineworkers - erecting earths). These figures comprise:

- Materials and Other costs: All direct material and other costs were included in this sub-category.
- Outage costs: Are all direct internal labour costs associated with "gaining access" ("outage costs") to the network (Operators - switching and Lineworkers - erecting earths). Of the total direct internal labour costs, 32.7% of these costs have been apportioned to "Outage Costs". The other remaining 67.3% has been allocated to "Contract Management" costs and has been discussed further below.

Therefore, the total "Other vegetation management" costs consist of 1 and 2 above.

All other sub-category costs

Due to the "Maintenance" contract structure of Ausgrid's vegetation management contracts, Ausgrid approached each of its incumbent contractors to request an apportionment of their total contract costs to assign to each sub-category. An average of these was taken to achieve the final splits shown.

Analysis was undertaken of Ausgrid's Contract Inspector/Officer direct internal labour booked to the contract work orders. The outcome was that approximately 80% of their time was committed to "Contract Management" and 20% of their time associated with "Outage costs".

The following assumptions were made:

- Ground clearance: 1% of Ausgrid's total tree trimming costs.
- Vegetation corridor clearance: 1% of Ausgrid's total tree trimming costs.
- Inspection: 4% of Ausgrid's total tree trimming costs.
- Audit: Of the total direct internal labour costs, 80% of these costs have been apportioned to "Contract Management". Of the total "Contract Management" costs, 60% of these costs have then been allocated to the "Audit" sub-category.

Contractor liaison Expenditure: Of the total direct internal labour costs, 80% of these costs have been apportioned to "Contract Management". Of the total "Contract Management" costs, 40% of these costs have then been allocated to the "Contractor liaison expenditure" sub-category.

"Other vegetation management costs" are a combination of direct material costs, direct other costs and the direct internal labour costs associated with "gaining access" ("outage costs") to the network (Operators - switching and Lineworkers - erecting earths).

Hazard tree cutting

Ausgrid established "Hazard tree cutting" program in FY2019 and the costs are captured by certain PM work orders.

Tree replacement program costs

Ausgrid does not have established "Tree replacement" programs, therefore the specific costs cannot reported separately. It has been included in the Tree trimming subcategory.

Ground clearance, Vegetation corridor clearance, Inspection, Audit, and Contract Liaison expenditure

Because Ausgrid's corporate asset management and finance system (SAP, TM1) has not been set up to capture the cost information in these sub-categories, this information has been apportioned across the different sub-categories based on information from our current contractors.

Assumptions:

N/A

Use of Estimated Information

Ausgrid's corporate asset management and finance system (SAP, TM1) has not been set up to capture the cost information for the sub-categories of Ground clearance, Vegetation corridor clearance, Inspection, Audit and Contract liaison expenditure, therefore this information has been apportioned across the different sub-categories based on information from our current contractors.

Reliability of Information

N/A

Table 2.7.3 - DESCRIPTOR METRICS ACROSS ALL ZONES - UNPLANNED VEGETATION EVENTS

Compliance with Requirements of the Notice

Ausgrid sources records from asset systems which to the best of our knowledge reflects actuals.

Updating of these asset systems is maintained through governance processes.

Where data is not available or requires review, best estimates are provided.

Source of Information

Data is sourced from an extract of a Sharepoint database containing Ausgrid's reported network fire event reports.

Methodology & Assumptions

The events are assigned to Vegetation Grow in or Blown in on the basis of a Vegetation Impact flag recorded in that database (either None, Vegetation Grow In, or Vegetation Blow/Fall In). Only events associated with vegetation are included in table 2.7.3

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

Template - 2.8 Maintenance

Table 2.8.1 - DESCRIPTOR METRICS FOR ROUTINE AND NON-ROUTINE MAINTENANCE 1

Compliance with Requirements of the Notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of Information

All data related to the quantities inspected have been extracted from SAP PM using Business Objects where the quantity is in tasks/jobs carried out. This information is stored in file "RIN - Routine Maintenance Task Completions for FY20".

For asset quantity and average ages, data has been obtained from SAP PM where the quantity is in units and from GIS where the quantity is a length in km.

Methodology & Assumptions

Pole overhead line & service line maintenance

For 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' the quantities inspected have been extracted from SAP PM using Business Objects and selecting all "Line Inspection" (LINS) and "Tower Inspection" (TINS) notifications. There has been a change along the lines of "Ausgrid conducts pole top/overhead line maintenance in conjunction with pole maintenance. Previously this number only included standalone transmission line inspection/tower inspection quantities, however Ausgrid considered it better representative to include combined pole and line inspection as well as the transmission line inspection/tower inspections. It is noted some transmission lines may be the subject to both inspections."

For 'POLES AND OVERHEAD LINES', 'SERVICE LINES' the quantity of inspections is entered as 0 as these assets are inspected as part of an overall routine line inspection. Due to data limitations the number of customers annually has been unable to be determined.

Pole inspection & treatment

For 'POLE INSPECTION AND TREATMENT', 'ALL POLES' the quantities inspected have been extracted from SAP PM using Business Objects and selecting all "Pole Inspection" (PINS) notifications.

Overhead asset inspection

For 'OVERHEAD ASSET INSPECTION' the length inspection has been calculated using the count of "Line Inspection" (LINS) notifications, the total number of Ausgrid poles and the total route length of overhead conductor. The formula used to calculate this value is shown below:

Length km= Total Overhead Conductor Route LengthTotal Number of Poles ×Number of Poles Inspected Annually

$$Length\ (km) = \frac{Total\ Overhead\ Conductor\ Route\ Length}{Total\ Number\ of\ Poles} \times Number\ of\ Poles\ Inspected\ Annually$$

Network underground cable maintenance by voltage

For 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', 'LV - 11 to 22kV', the quantities inspected have been extracted from SAP PM using Business Objects and by selecting the following notifications within the asset group Distribution Mains Underground (DMUG):

- Pit Lid (PITL) tasks
- Pillar (PILR) tasks
- Thermovision (THRM) tasks

The maintenance of underground cable is not conducted linearly, but that discrete points such as pit lids/transmission linkboxes are included in the inspected/maintained.

For 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', '33KV AND ABOVE', the quantities inspected have been extracted from SAP PM using Business Objects and by selecting the following notifications within the asset group Transmission Mains Underground (TMUG):

- Pit Lid (PITL) tasks
- Performance (PERF) tasks

Network underground cable maintenance by voltage

For 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY LOCATION' the required data is not retained in a way that the number of assets inspected/maintained can be reported in these categories. As such an apportionment of the total number of assets inspected/maintained for 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY VOLTAGE' has been applied using the proportionate length of underground high voltage cable in the CBD feeder category. This proportion is contained in file "Routine Maintenance Task Completions RIN FINAL FY20".

Distribution substation equipment & property maintenance

For 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION TRANSFORMERS' the quantity of inspections is entered as 0 as these assets are inspected as part of an overall substation inspection with all others assets in the substation (with the exception of the HV switchgear).

For 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR', the quantities inspected have been extracted from SAP PM using Business Objects and selecting all switchgear tasks within the asset groups Distribution Mains Underground (DMUG) and Distribution Substations (DC).

For 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT', the quantities inspected have been extracted from SAP PM using Business Objects and selecting the following notifications within the asset group Distribution Substations (DC):

- All SU tasks (excluding SU0106, SU0108, SU0109, SU0151, SU0115, SU0116, SU0401, SU0402 tasks)
- All TX tasks
- All DC tasks

All PETS tasks have been excluded from the total count for this category.

For 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION PROPERTY', the quantities inspected have been extracted from SAP PM using Business Objects and selecting the following notifications within the asset group Distribution Substations (DC):

- All AU tasks
- SU0106, SU0108, SU0109, SU0401 and SU0402 tasks

Zone substation equipment maintenance

For 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS ZONE SUBSTATION' the quantities inspected have been extracted from SAP PM using Business Objects and selecting all "Transformer Inspection" (TX) notifications for the following 'DNSP' asset groups:

- Zone Substations (ZN)
- Transmission Substations (TS)

For 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS DISTRIBUTION' the quantity of inspections is entered as 0 as these assets are inspected as part of an overall substation inspection with all others assets in the Zone substation.

For 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS HV' the quantity of inspections is entered as 0 as Ausgrid does not capture information in this format. Based on the information available, all asset inspections related to Zone power transformers at Ausgrid have been categorised as Transformers - Zone Substation, thus no assets have been categorised as 'TRANSFORMERS HV'.

For 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT', the quantities inspected have been extracted from SAP PM using Business Objects and selecting the following tasks within the 'DNSP' asset groups Zone Substations (ZN) and Transmission Substations (TS):

- All DC tasks
- ER0102 and ER0103 tasks
- PR0101 and PR0201 tasks
- SU0101, SU0115, SU0116 and SU0121 tasks
- All Switchgear tasks

All OH4004, SU0121, ER0104, ER0105, VR0101 tasks have been excluded from the total count for this category.

Zone substation property maintenance

For 'ZONE SUBSTATION PROPERTY MAINTENANCE', 'ALL ZONE SUBSTATION PROPERTIES' the quantities inspected have been extracted from SAP PM using Business Objects and selecting all the following notifications within the 'DNSP' asset groups Zone Substations (ZN) and Transmission Substations (TS):

- All AU tasks (Excluding STCK tasks)
- SU0106, SU0140, SU0141, SU0108, SU0109, SU0110, SU0111, SU0112, SU0113 and SU3001 tasks

Public lighting maintenance

For 'PUBLIC LIGHTING MAINTENANCE', 'MINOR ROADS' and 'PUBLIC LIGHTING MAINTENANCE', 'MAJOR ROADS' categories combined, the quantities inspected have been extracted from SAP PM using Business Objects and selecting "Bulk Lamp Replacement" notifications. However, the required

data is not retained in a way that the number of assets inspected/maintained can be reported in these two categories. As such an apportionment of the total number of assets inspected/maintained for 'PUBLIC LIGHTING MAINTENANCE', 'MINOR ROADS' and 'PUBLIC LIGHTING MAINTENANCE', 'MAJOR ROADS' has been applied using the proportionate number of street lights in the major roads category. This proportion is contained in file "Routine Maintenance Task Completions RIN FINAL FY18".

SCADA & network control maintenance

For 'SCADA & NETWORK CONTROL MAINTENANCE' there are no routine maintenance tasks undertaken for these assets, thus the inspection/maintenance quantities reported are 0.

Protection Systems maintenance

For 'PROTECTION SYSTEMS MAINTENANCE', tasks for inspection/maintenance are not identified individually and are performed in conjunction with the corresponding switchgear maintenance, and as the expenditure for these tasks is also contained within the corresponding switchgear category the quantities reported in this category (and sub-categories) is 0.

Sub-Transmission asset maintenance (For DNSP's with dual function assets)

For 'SUB-TRANSMISSION ASSET MAINTENANCE', the quantities inspected have been extracted from SAP PM using Business Objects and selecting all the notifications within the following 'TNSP' asset groups:

- Zone Substations (ZN)
- Transmission Substations (TS)
- Transmission Overhead (TMOH)
- Transmission Underground (TMUG)

The maintenance is not conducted linearly, but that discrete subtransmission assets such as zone/subtransmission equipment is included in the inspected/maintained.

Various assets

For 'VARIOUS ASSETS' there are no routine maintenance tasks undertaken for these assets, thus the inspection/maintenance quantities reported are 0.

Ground clearance access tracks

'GROUND CLEARANCE ACCESS TRACKS' are inspected as part of the pole & line inspection but due to data limitations the number of access tracks inspected annually has been unable to determine.

Use of Estimated Information

Reliability of Information

Table 2.8.1 - DESCRIPTOR METRICS FOR ROUTINE AND NON-ROUTINE MAINTENANCE 2

Compliance with Requirements of the Notice

Ausgrid sources records from asset systems which to the best of our knowledge reflects actuals. Updating of these asset systems is maintained through governance processes. Where data is not available or requires review, best estimates are provided.

Source of Information

Asset quantity and average age data has been obtained from SAP PM where the quantity is in units and from GIS where the quantity is a length. Data has been extracted from SAP PM via the reporting environment using a multitude of Business Objects reports. Where the lengths of conductors and cables are used, the data source has been extracted from the GIS geospatial database.

Inspection cycles have been obtained from the Network Technical Maintenance Plan database.

Methodology & Assumptions

Pole overhead line & service line maintenance

For 'SERVICE LINES' this data has been obtained from GIS.

For 'POLE TOPS AND OVERHEAD LINES' this data has been obtained from SAP PM via SAP BO. A combination of current status, commissioned date and retired date is used to determine if an asset was commissioned at the end of the year. Assets include poles and pillar standards.

Pole inspection and treatment

This data has been obtained from SAP PM via SAP BO. A combination of current status, commissioned date and retired date is used to determine if an asset was commissioned at the end of the year. Assets include poles and pillar standards.

Overhead asset inspection

This data has been obtained from the yearly GIS extract giving length of commissioned mains by age. The following table shows the filters applied and field summated in the files to produce the result:

Data extract file filters		Data used
Asset Category	Primary Operation Voltage	Length field used
LV line	LV	Length Total ODRC (kms)
HV line	11kV	
	12.7kV	
	22kV	
	33kV	
	66kV	
	132kV	

Network underground cable maintenance by voltage

This data has been obtained from the yearly GIS extract giving length of commissioned mains by age. For category 'LV - 11 to 22kV' the following table shows the filters applied and field summated in the files to produce the result.

Data extract file filters		Data used
Asset Category	Primary Operation Voltage	Length field used
LV cable	LV	Length Total ODRC (kms)
HV cable	5kV	
	11kV	
	22kV	

For category '33kV and above', this data has been obtained from the yearly GIS extract giving length of commissioned mains by network age.

The following table shows the filters applied and field summated in the files to provide a total cable length commissioned at these voltages. A percentage has then been calculated to split this length into assets that are identified as dual function assets and those considered wholly DNSP function. This percentage has been obtained from SAP PM, via a Business Objects report. This percentage is then applied to the corresponding length for voltages 33kV and above.

Data extract file filters		Data used
Asset Category	Primary Operation Voltage	Length field used
HV cable	33kV	Length Total ODRC (kms)
	66kV	
	132kV	

Network underground cable maintenance: by location

For 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY LOCATION' the required data is not retained in a way that installed lengths can be reported in these categories. As such an apportionment of the total lengths for 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY VOLTAGE' has been applied using the proportionate length of underground high voltage cable in the CBD feeder category.

Distribution substation equipment & property maintenance

The data for Distribution Substation Transformers has been obtained from data extracted from SAP PM using SAP BO. All assets with a 'Room' field value of "DSP_DC" (representing distribution substations) and in commission at the end of the financial year.

The data for Distribution Substation Switchgear has been obtained from data extracted from SAP PM using SAP BO. All assets with a 'Room' field value of "DSP_DC" (representing distribution substations) OR DSP_DMOH (representing distribution mains - as per instructions from the AER during Reset RIN submission), and in commission at the end of the financial year, and are of an 'enclosed' switch type that is proactively maintained has been included in the calculation.

The data for Distribution Substation - Other Equipment is a count of all distribution substations (as the AER specified "Earth Mat" appears to be a typographical error) and has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_BASEMT, SUB_BUILD, SUB_KIOSK, SUB_OE, SUB_POLE, SUB_UNDERG and SUB_UPPERL, and identifying assets commissioned at the end of the financial year.

The data for Distribution Substation Property has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_BASEMT, SUB_BUILD, SUB_OE, SUB_UNDERG and SUB_UPPERL, and identifying assets commissioned at the end of the financial year.

Zone substation equipment maintenance

The data for Transformers - Zone Substation has been obtained from data extracted from SAP BO. All zone and STS transformer assets with a object type 'TX_SUBTRANS' and 'TX_ZONE', 'Room' "DSP_ZN" or "DSP_TS" (representing wholly DNSP assets) and in commission at the end of the financial year.

The data for Transformers - Distribution has been obtained from data extracted from SAP BO. All distribution transformer with an object type 'TX_DIST' and 'TX_AUX', 'Room' of "DSP_ZN" or "DSP_TS" (representing wholly DNSP assets inside zone/subtransmission substations boundary) and in commission at the end of the financial year are included in the calculation.

Based on the information available, all power transformers at Ausgrid have been categorised as either Transformers - Zone Substation or Transformers - Distribution, thus no assets have been categorised as Transformer - HV.

The data for Zone Substation - Other Equipment is a count of DNSP categorised substations and has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_ZONE, SUB_STS and SUB_STSS, selecting only wholly DNSP assets by using the 'Room' field = "DSP_ZN" or "DSP_TS", and identifying assets commissioned at the end of the financial year.

Zone substation property maintenance

The data for Zone Substation Property has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_ZONE, SUB_STS and SUB_STSS, selecting only wholly DNSP assets by using the 'Room' field = "DSP_ZN" or "DSP_TS", and identifying assets commissioned at the end of the financial year.

Public lighting maintenance

Extracted data for streetlights from SAP PM via Business Objects has been filtered by Lamp wattage to categorise the Major/Minor road category for Public lighting maintenance. A combination of current status, commissioned date, decommissioned date and retired date is used to determine if a light was commissioned at the end of the financial year.

SCADA & network control maintenance

The unit of measure is specified as number of systems. As such the data has been sourced from SAP BO using the functional location object type = "CTL_SYSTEM". Data has been selected by identifying assets commissioned at the end of the financial year.

Protection systems maintenance

The unit of measure is specified as number of systems. As such the data has been sourced from SAP BO using the functional location object type = "PROT_GRP". Data has been selected by identifying assets commissioned at the end of the financial year.

Subtransmission asset maintenance

The volume and age of dual function assets were sourced from SAP BO and GIS. A TSP/DSP feeder split was performed using mapped data.

Average age of asset group

Pole overhead line & service line maintenance

For 'POLE TOPS AND OVERHEAD LINES' this data has been obtained from SAP PM via SAP BO.A combination of current status, commissioned date and retired date is used to determine the age of an asset at the end of the financial year. The average age of the assets for each year is then calculated. Assets include poles and pillar standards.

Pole inspection and treatment

This data has been obtained from SAP PM via SAP BO.A combination of current status, commissioned date and retired date is used to determine the age of an asset at the end of the financial year. Assets include poles and pillar standards.

Overhead asset inspection

This data has been obtained from the yearly GIS extract giving length of commissioned mains by age. The following table shows the filters applied and field summated in the files to produce the result:

A weighted average age is then calculated by using the sum of product of each age with the length associated and dividing through by the total length.

Network underground cable maintenance by voltage

This data has been obtained from the yearly GIS extract giving length of commissioned mains by age. For category 'LV - 11 to 22kV' the following table shows the filters applied and field summated in the files to produce the result:

Data extract file filters		Data used
Asset Category	**Primary Operation Voltage**	**Length field used**
LV cable	LV	Length Total ODRC (kms)
HV cable	5kV	
	11kV	
	22kV	

A weighted average age is then calculated by using the sum of product of each age with the length associated and dividing through by the total length.

For category '33kV and above' and 'Subtransmission Underground Maintenance', this data has been obtained from the yearly GIS extract giving length of commissioned mains by network age. The following table shows the filters applied and field summated in the files to provide a total cable length

commissioned at these voltages. A weighted average age is then calculated by using the sum of product of each age with the length associated and dividing through by the total length.

Data extract file filters		Data used
Asset Category	**Primary Operation Voltage**	**Length field used**
HV cable	33kV	Length Total ODRC (kms)
	66kV	
	132kV	

Network underground cable maintenance: by location

For 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY LOCATION' the required data is not retained in a way that average age can be separately calculated for these categories. As such the average age across all voltages has been used for both categories. This has been calculated by getting the weighted average of the two values in category 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY VOLTAGE'.

Distribution substation equipment

The data for Distribution Substation Transformers has been obtained from data extracted from SAP BO. All assets with a 'Room' field value of "DSP_DC" (representing distribution substations) and in commission at the end of the financial year (use field 'Include in Age Profile' = "Y") are included in the calculation.

The data for Distribution Substation Switchgear has been obtained from data extracted from SAP BO. All assets with a 'Room' field value of "DSP_DC" (representing distribution substations) OR DSP_DMOH (representing distribution mains - as per instructions from the AER during Reset RIN submission), and in commission at the end of the financial year, and are of an 'enclosed' switch type that is proactively maintained has been included in the calculation.

The data for Distribution Substation - Other Equipment is the average age of all distribution substations and has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_BASEMT, SUB_BUILD, SUB_KIOSK, SUB_OE, SUB_POLE, SUB_UNDERG and SUB_UPPERL, and identifying assets commissioned at the end of the financial year.

The data for Distribution Substation Property has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_BASEMT, SUB_BUILD, SUB_OE, SUB_UNDERG and SUB_UPPERL, and identifying assets commissioned at the end of the financial year.

Zone substation equipment maintenance

The data for Transformers - Zone Substation has been obtained from data extracted from SAP PM Business Objects Reports. All assets with a 'Room' field value of "DSP_ZN" or "DSP_TS" (representing wholly DNSP assets) and in commission at the end of the financial year.

The data for Transformers - Distribution has been obtained from data extracted from SAP PM PM Business Objects Reports. All assets with a 'Room' field value of "DSP_ZN" or "DSP_TS" (representing wholly DNSP assets inside zone/subtransmission substations) and in commission at the end of the financial year.

Based on the information available, all power transformers at Ausgrid have been categorised as either Transformers - Zone Substation or Transformers - Distribution, thus no assets have been categorised as Transformer - HV.

The data for Zone Substation - Other Equipment is the average age of DNSP categorised substations and has been obtained from data extracted from SAP PM PM Business Objects Reports. Data has been selected by including Object types SUB_ZONE, SUB_STS and SUB_STSS, selecting only wholly DNSP assets by using the 'Room' field = "DSP_ZN" or "DSP_TS", and identifying assets commissioned at the end of the financial year.

Zone substation property maintenance

The data for Zone Substation Property has been obtained from data extracted from SAP BO. Data has been selected by including Object types SUB_ZONE, SUB_STS and SUB_STSS, selecting only wholly DNSP assets by using the 'Room' field = "DSP_ZN" or "DSP_TS", and identifying assets commissioned at the end of the financial year.

Public lighting maintenance

Extracted data for streetlights from SAP PM via Business Objects has been filtered by Lamp wattage to categorise the Major/Minor road category for Public lighting maintenance. A combination of current status, commissioned date, decommissioned date and retired date is used to determine if a light was commissioned at the end of the financial year. The average age of the assets is then calculated using the standard MS Excel average function in a pivot table.

SCADA & network control maintenance

The unit of measure is specified as number of systems. As such the data has been sourced from SAP BO using the functional location object type = "CTL_SYSTEM". Data has been selected by identifying assets commissioned at the end of the financial year.

Protection systems maintenance

The unit of measure is specified as number of systems. As such the data has been sourced from SAP BO using the functional location object type = "PROT_GRP". Data has been selected by identifying assets commissioned at the end of the financial year.

Subtransmission asset maintenance

The volume and age of dual function assets were sourced from SAP BO, GIS and the latest Transmission Asset Classification for any updates to the classifications. A TSP/DSP feeder split was performed using mapped data.

Inspection and maintenance cycles

A detailed list of cycles has been included in each category showing the various maintenance tasks required and the cycles of those tasks. Where a pro-active task is primarily of an inspection nature, the task cycle has been populated in the Inspection Cycle column. Where a pro-active task primarily contains manual maintenance activities, the task cycle has been populated in the Maintenance Cycle column. Where a task contains both Inspection and Maintenance activities, both columns have been populated. If either type is not applicable for a maintenance activity the cycle has been entered as 0. At the applicable category/sub-category level, the cycles have been entered as 0 with the subsequent rows containing the maintenance types disaggregated holding the applicable cycles within that category.

Network underground cable maintenance: by location

Maintenance is only conducted on transmission (>=33kV underground cables) - refer to NETWORK UNDERGROUND CABLE MAINTENANCE: BY VOLTAGE, as such representation of maintenance cycles by CBD/non-CBD is impractical and has been omitted.

Subtransmission asset maintenance

The maintenance cycle of subtransmission assets varies between 6 months and 12 years due to the broad nature of this category, the typical maintenance period of 5 years has been included.

Assumptions:

- Maintenance Cycles for pro-active 'PROTECTION SYSTEMS MAINTENANCE' are not identified individually, and are performed in conjunction with the corresponding switchgear maintenance.
- Dual function assets are all included in the 'SUBTRANSMISSION ASSET MAINTENANCE' category. This includes assets within locations that have been designated as dual function (e.g. switchgear within a dual function substation). For assets categorised using information from SAP PM, anything with a 'Business Type' value (held in the first 3 characters of the 'Room' field) of "TSP" indicates it is for a dual function asset.

- The 'ZONE SUBSTATION…' categories also include assets in what Ausgrid refers to as subtransmission substations where these assets are for DNSP functions only. This is assumed due to the specification of the 'SUBTRANSMISSION ASSET MAINTENANCE' category as being for dual function assets only.
- A percentage is applied to the corresponding length for voltages 33kV and above where assets that are identified as dual function assets and those considered wholly DNSP function.

Use of Estimated Information

Reliability of Information

Table 2.8.2 - COST METRICS FOR ROUTINE AND NON-ROUTINE MAINTENANCE

Compliance with Requirements of the Notice

The information in this section is compliant in that actual values are used where possible, and best estimates are provided where actual data is not available.

Source of Information

Financial spend for routine and non-routine maintenance has been obtained from SAP PM (work order costs) using Business Objects.

Methodology & Assumptions

Routine and non-routine maintenance costs

Financial data has been obtained using a modified version of the "Maintenance Cost & Productivity" Business Objects report. The report has been modified to restrict costs to direct costs only (as specified for this section of the RIN) by filtering on specific cost element groups. To restrict "Labour" costs to direct costs only the cost element groups LOB-NTA and LOB-OTA have been used. To restrict "Materials" costs to direct costs only the cost element group LOB-MAT has been used. To restrict "Contracted Services" to direct costs only, the cost element group LOB-CONT has been used. To restrict "Other" costs to direct costs only the cost element group LOB-OTHDIR has been used. The report has also been modified to allow costs to be split between DNSP dual function assets and single function assets. The report has also excluded the Asset Group DSP_SUPP as it is not relating to system maintenance costs. These reports have been extracted into an MS Excel file "Maintenance Task Cost and Productivity Report - All Direct Only - FY19.xlsx" and manually mapped to the applicable asset categories. "Routine maintenance" costs are those settled against PM01 "inspection" work orders, "Non-routine maintenance" costs are those settled against PM02 "corrective" work orders. Costs have then been summated for the categories for each year, excluding costs on maintenance orders that have been identified as for Vegetation Maintenance (and reported separately in this RIN). Expenditure that is located within the 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' RIN category has also been reduced as 50% of the LiDAR expenditure has been removed and allocated to Vegetation Maintenance (and reported separately in this RIN within 2.7)

The extracted information in the MS Excel file "Maintenance Task Cost & Productivity Report - All Direct Only - FY20.xlsx" mapped expenditure to Ausgrid allocated "asset groups" and "asset categories" based on the maintenance activity type / maintenance task and the functional location type of the asset maintained or the "asset category. These asset groups were then aligned to the RIN asset categories

and sub-categories. The SAP "Room" field was also used to determine whether the expenditure was allocated to "DNSP" or "TNSP" categories ("Room" field of "DSP" was allocated as distribution asset expenditure, "Room" field of "TSP" was allocated as subtransmission asset expenditure). Any expenditure against the maintenance activity type of "Vegetation management" has been excluded in accordance with the RIN preparation rules.

Where the SAP extracts did not contain information in regard to the Ausgrid allocated asset group or the maintenance activity type/maintenance task, or where the RIN definitions required mapping away from an Ausgrid asset group, the expenditure was allocated to a RIN asset category and sub-category based on the workgroup for which the expenditure was incurred for routine maintenance expenditure and/or the SAP "asset category" for non-routine expenditure. The assumptions used are detailed below:

For the "Communication" asset group:

- This asset group is assumed to be for network control / data assets outside of substations; and
- Expenditure identified against this asset group was assigned to "SCADA and network control maintenance".

For the "Distribution mains overhead" asset group:

- For Field Services OH sections, expenditure was assigned to 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' unless the asset category was defined as "LV Service Mains Conductor & Accessories" and "LV Service Mains - Residential " (expenditure allocated to 'POLES AND OVERHEAD LINES', 'SERVICE LINES') or the asset category was defined as OH control points (expenditure was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR'). Note: The service line sub-category is not used for routine maintenance as Ausgrid undertake the inspection of service wires as part of routine line inspection.
- For Field Services or Transmission Sydney Line inspection workgroups or where maintenance activity "Line inspection" or "Bushfire patrol" is defined, expenditure was assigned to 'OVERHEAD ASSET INSPECTION'.
- For Asset Access workgroups, expenditure was assigned to 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', 'LV - 11 to 22kV' as it is assumed that the majority of their work would be in relation to the access of HV pits in the Sydney CBD.

- For Voltage Regulation workgroups or transformer related inspection tasks, expenditure was assigned to 'DISTRIBUTION SUBSTATIONS OTHER' category as voltage regulators or capacitors are the only assets maintained by these groups on distribution overhead assets.
- For workgroups with "Pole Insp" in their title, expenditure was assigned to 'POLE INSPECTION AND TREATMENT', 'ALL POLES' as this is the assumed majority of their work.
- For building maintenance workgroups, expenditure was assigned to 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' as their work in this asset category, primarily graffiti removal, was considered not appropriate to be assigned to 'POLE INSPECTION AND TREATMENT', 'ALL POLES' as it is not planned inspection / testing.
- For protection workgroups, battery maintenance tasks are assumed to be for 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT' as the tasks for reclosers /ELBS's include battery replacement within the "SW180*" tasks. Non-routine expenditure is assumed to be for 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR', primarily reclosers or ELBS's.
- For telecontrol workgroups, expenditure was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR' based on the assumption that SCADA related work is mostly undertaken on reclosers / ELBS's and the asset category was identified as OH control points.
- For substations workgroups, expenditure was assigned to 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' if the asset category was related to OH conductors, or assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR' if the asset category was related to OH control points.
- For customer connections workgroups, expenditure was assigned to 'POLES AND OVERHEAD LINES', 'SERVICE LINES' unless the asset category was related to LV mains or conductor (this expenditure assigned to 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES').

For the "Distribution mains underground" asset group:

- Expenditure for all workgroups was assigned to "Network underground cable maintenance / LV - 11 to 22 kV" except for expenditure where the asset category was identified as either "UG Services - LV" or "Sub-transmission Mains UG General (including spares)".

- Expenditure identified against the asset category "UG Services - LV" was assigned to "Pole, overhead line and service line maintenance /Service lines" as per RIN definitions.
- Expenditure identified against the asset category "Sub-transmission Mains UG General (including spares)" was assigned to "Network underground cable maintenance / 33kv and above".
- Expenditure identified against task "UG2101" task (pillar thermovision inspections) was assigned to "Network underground cable maintenance / LV - 11 to 22 kV".

For the "Distribution substations" asset group:

- Expenditure identified against an "SW" task, against an asset category for HV switchgear or against an asset category for 11kV OH control point was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION SWITCHGEAR (WITHIN SUBSTATIONS AND STAND ALONE SWITCHGEAR'.
- Expenditure identified against either a "TX" task or a voltage regulation workgroup was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT'.
- Expenditure identified against a "DC" task was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT'.
- Expenditure identified against an "SU" task (except for task SU0106, SU0108-0113) was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT' as these tasks include inspection of housings, transformers, LV boards, HV switchgear and testing of earthing systems and expenditure would be very difficult to disaggregate to a lower level
- Expenditure identified against task "SU0106, SU0108-0113 against asset categories which include "Land"/"Building", against building maintenance workgroups or against maintenance activity types related to asbestos removal were assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION PROPERTY'. This expenditure could not be disaggregated between the building components and electrical components.
- Where a task was not identified in the extract, expenditure was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION

OTHER EQUIPMENT' as it could have been for switchgear, protection or communication systems. LV boards, building issues etc.

- Expenditure identified against an asset category which included "Distribution transformer" or a Transformer Services workgroup were assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION TRANSFORMERS' for non-routine maintenance expenditure only as routine tasks to inspect distribution transformers are covered in the general substation inspection tasks.
- Expenditure identified against an asset category which included "Zone transformer" was assigned to 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS ZONE SUBSTATION'.
- Any expenditure associated with the ER tasks was assigned to 'DISTRIBUTION SUBSTATION EQUIPMENT & PROPERTY MAINTENANCE', 'DISTRIBUTION SUBSTATION OTHER EQUIPMENT'.

For the "Sub-transmission substations" asset group:

- Expenditure against this asset group includes both "DSP" and "TSP" room field values. "DSP" expenditure has mostly been assigned to Zone substation RIN categories and "TSP" expenditure has mostly been assigned to Subtransmission asset RIN categories as detailed below.
- Expenditure identified against an "SW" task or against an asset category for "switchgear" was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against either a "TX" task, a "VR" tasks or a voltage regulation workgroup was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS ZONE SUBSTATION' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "DC" task or a "DC systems" asset category was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "PR" task or against an asset category for "CT's and VT's" was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or

'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).

- Expenditure identified against an "ER" task was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified which does not have a task or asset category, or which has a "general" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "Reactor and capacitor" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against an "SU" task (except for tasks SU0106, SU0115 or SU0116) was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against an "SU0115" or "SU0116" task or an "Oil Cont" workgroup was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against task "SU0106, SU0108-0113 against asset categories which include "Land" / "Building" or against building maintenance workgroups was assigned to the 'ZONE SUBSTATION PROPERTY MAINTENANCE', 'ALL ZONE SUBSTATION PROPERTIES' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified which does not have a task and is against a Telecontrol workgroup, or which has a "Communications" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "Protection and control" asset category and a Protection workgroup was assigned to the 'PROTECTION SYSTEMS MAINTENANCE' RIN category.

For the "Transmission Overhead" asset group:

- Expenditure against this asset group includes both "DSP" and "TSP" room field values. "DSP" expenditure has mostly been assigned to "Pole, Overhead Line and Service line maintenance" RIN sub-categories and "TSP" expenditure has mostly been assigned to "Subtransmission asset maintenance" RIN sub-categories as detailed below.
- Expenditure identified against maintenance activity "Line inspection", Thermovision" or "Bushfire patrol" was assigned to 'OVERHEAD ASSET INSPECTION'.
- Expenditure identified against maintenance activity "Pole inspection" was assigned to the 'POLE INSPECTION AND TREATMENT', 'ALL POLES' RIN category.
- Expenditure identified against an "SW" task and a Protection workgroup was assigned to 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' due to the very small expenditure.
- Expenditure identified against a "Control point" asset category and an OH workgroup was assigned to 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES'.
- Expenditure identified against maintenance activity "Tower inspection", against a "Tower line" asset category or a "Tower" workgroup was assigned to the 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN category and "Tower lines" RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "Sub-transmission Mains UG" asset category was assigned to the assigned to 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', '33KV AND ABOVE' RIN sub-category.
- All other expenditure was assigned to the 'POLES AND OVERHEAD LINES', 'POLE TOPS AND OVERHEAD LINES' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN category and "Tower lines" RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).

For the "Transmission Underground" asset group:

- Expenditure against this asset group includes both "DSP" and "TSP" room field values. "DSP" expenditure has been assigned to the 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', '33KV AND ABOVE' RIN sub-category and "TSP" expenditure has been assigned to the 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category.

For the "Zone substations" asset group:

- Expenditure against this asset group includes both "DSP" and "TSP" room field values. "DSP" expenditure has mostly been assigned to Zone substation RIN categories and "TSP" expenditure has mostly been assigned to Subtransmission asset RIN categories as detailed below.
- Expenditure identified against an "SW" task or against an asset category for "switchgear" was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against either a "TX" task, a "VR" tasks or a voltage regulation workgroup was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'TRANSFORMERS ZONE SUBSTATION' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "DC" task or a "DC systems" asset category was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "PR" task or against an asset category for "CT's and VT's" was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified which does not have a task or asset category, or which has a "general" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "Reactor and capacitor" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against an "SU0115" or "SU0116" task or an "Oil Cont" workgroup was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).

- Expenditure identified against task "SU0106, SU0108-0113 against asset categories which include "Land" / "Building" or against building maintenance workgroups was assigned to the 'ZONE SUBSTATION PROPERTY MAINTENANCE' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified which does not have a task and is against a Telecontrol workgroup, or which has a "Communications" or "CLC" asset category, was assigned to the 'ZONE SUBSTATION EQUIPMENT MAINTENANCE', 'OTHER EQUIPMENT' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).
- Expenditure identified against a "Protection and control" asset category and a Protection workgroup was assigned to the 'PROTECTION SYSTEMS MAINTENANCE' RIN category.
- Expenditure identified against a "Transmission UG" or "Tunnels" workgroup was assigned to the 'NETWORK UNDERGROUND CABLE MAINTENANCE BY VOLTAGE', '33KV AND ABOVE' or 'SUB-TRANSMISSION ASSET MAINTENANCE' RIN sub-category (based on the "Room" field value, i.e. TNSP or DNSP).

For the "NA" and "Not assigned" asset groups:

Expenditure was assigned to a RIN category and sub-category based on either the task, the workgroup and where that workgroup is most likely to work, or the asset category and could also be a mixture of either of these as to where the expenditure was assigned.

Assumptions:

Global assumptions

Dual function assets are all included in the 'SUBTRANSMISSION ASSET MAINTENANCE' category. This includes assets within locations that have been designated as dual function (e.g. switchgear within a dual function substation). For assets categorised using information from SAP PM, anything with a 'Business Type' value (held in the first 3 characters of the 'Room' field) of "TSP" indicates it is for a dual function asset.

The 'ZONE SUBSTATION...' categories also include assets in what Ausgrid refers to as subtransmission substations where these assets are for DNSP functions only. This is assumed due to the specification of the 'SUBTRANSMISSION ASSET MAINTENANCE' category as being for dual function assets only.

Some costs for SCADA and network control maintenance are contained within the corresponding individual categories with 'ZONE SUBSTATION MAINTENANCE' and 'SUBTRANSMISSION ASSET

MAINTENANCE'. This is due to the data in the reports not having the required attributes to be able splits costs incurred by the field group that works on both SCADA and CLC assets.

Use of Estimated Information

For 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY LOCATION' the required data is not retained in a way that costs can be reported in these categories. As such an apportionment of the total costs for 'NETWORK UNDERGROUND CABLE MAINTENANCE: BY VOLTAGE' has been applied using the proportionate length of underground high voltage cable in the CBD feeder category. This is considered the best estimate as it uses actual total figures for Network Underground Cable Maintenance, but apportioned according to asset quantities. For 'PUBLIC LIGHTING MAINTENANCE' the required data is not retained in a way that costs can be reported in these categories. As such the total costs reported for public lighting maintenance has been apportioned to the two categories proportionately according to the total number of assets installed at the end of each year. This is considered the best estimate as it uses actual total figures for Public Lighting Maintenance, but apportioned according to asset quantities.

Reliability of Information

FY20 Non-Routine expenditure has increased by approximately 30% comparing with FY19. This is primarily due to the catch up of backlog jobs that were delayed by Live Work Pause practice.

Template - 2.9 Emergency

Table 2.9.1 - EMERGENCY RESPONSE EXPENDITURE (OPEX)

Compliance with Requirements of the Notice

The information provided in table 2.9.1 is consistent with the requirements of the RIN. The information is consistent with the definition of emergency response, major storm and major events provided in Appendix F of the RIN. The information is consistent with the requirements in paragraph 14.1 of Appendix E of the RIN. The information includes the following expenditure for each regulatory year:

1. Total emergency response expenditure
2. Emergency response expenditure attributable to major events by identifying direct costs through a specific cost code for each major event or major storm. Major events most often refer to, but are not limited to, a major storm.
3. Emergency response expenditure attributable to major event days by identifying daily operating expenditure incurred on each date of those major event days and summing up the expenditure for each event.

As required by paragraph 1.15 of the Appendix E, of the RIN, Template 2.9 information is the Direct Costs only, and excludes expenditures on Overheads.

Source of Information

Financial data included in template 2.9 is sourced from SAP and TM1 (Ausgrid's financial accounting and financial reporting systems).

The major event days are defined using the TMED metric. Definition is defined as "TMED - The threshold of daily SAIDI performance which identifies a "major event day". The TMED threshold is calculated according to the IEEE Std-1366 guidelines (section 4.5), and also described in Schedule 6 of the Licence Conditions".

TMED days are included in other RIN templates and are a subset of those worksheet including direct costs.

It is important to note that costs associated with major event days vary depending on the extent of damage to the network sustained and the labour, material and contracted services required to rectify the network following the event.

PM03 (Breakdown), PM04 (Nature Induced Breakdown) and PM05 (Emergency Recoverable Works) was used as the basis for determining 'emergency expenditure'. A given list of days in which TMED was

exceeded was used to define the total expenditure in more detail as required by isolation of each of the costs by major event day (using Business Objects). The overall amount excludes any capitalised costs, such as minor capital expenditure incurred with any associated rectification works.

Methodology & Assumptions

Ausgrid has prepared 2019/20 information based on these categories. 2019/20 has used the same methodology as was applied in the regulatory accounting statements for 2014/15, 2015/16, 2016/17, 2017/18 and 2018/19 with only one variation. Emergency Recoverable Works were not included in this category in the previous Regulatory Period as they were classified as External Line of Business. These works have been re-classified as Standard Control Services if not recovered in the current Regulatory Period and have been incorporated accordingly.

The steps in the obtaining the outcomes are:

1. Extract lists of PM03, PM04 and PM05 orders using SAP & TM1
2. Exclude any orders associated with Alternate Control Services or Fleet
3. Extract all costs associated with these cost objects
4. Source list of TMED days for separation of defined major event days
5. With TMED days list, isolate orders associated with work on those days or after which work was carried out. PM04 orders were selected on major event days where a storm was identified. No PM03 orders were used in 2019/20 as no TMED days were due to equipment failure.
6. Emergency Service Officers (EMSO) costs (sourced via TM1) have been included on the basis of 93.4% allocation of total costs for 'emergency work', with the balance representing other network activities such as reconnection and off-peak conversion works. There was an increase in this rate from 88.3% in 2018/19 to 93.4% in 2019/20 primarily as a result of reduced demand for those other activities.
7. EMSO costs have been divided over the 365 days per year (24/7 shifts), and for each TMED day the average cost per day has been included as an allocation to each major event days cost.

Assumptions made are:

- PM03, PM04 and PM05 defines emergency response
- TMED days exceeding the 2019/20 threshold of 3.44 define major event days
- Call Centre staff costs are included as indirect cost
- Classification of works as emergency works and the recording of time through the internal time and attendance process are relied upon.
- The costs associated with a major event can be carried out after the actual day exceeding the TMED threshold.

Use of Estimated Information

Emergency Service Officers (EMSO) costs have been included as an estimate as EMSOs do not usually allocate their time to individual activities. Where identified that EMSO staff have booked to work orders, these costs have been excluded from the estimate, so there is no overlap or inflation of costs due to double counting.

EMSO costs associated with emergency response work were calculated based on the business determined proportion of 93.4% of the total direct costs. To calculate the major events a daily EMSO rate was used. Refer to steps 5 & 6 in the methodology stated above.

Reliability of Information

Template - 2.10 Overheads A

Table 2.10.1 - NETWORK OVERHEADS EXPENDITURE

Compliance with Requirements of the Notice

The compliance with the RIN notice is based on a Business Intelligence (BI) report from Ausgrid's SAP financial system and/or TM1 report . Information reported in table 2.10.1 aligns with Ausgrid's Cost Allocation Methodology (CAM).

Source of Information

Actual data for 2019/20 is from TM1 and/or SAP BI (Ausgrid financial reporting system).

Methodology & Assumptions

The split of overhead costs between network and corporate overheads is based on mapping of RIN categories reported in Ausgrid's 2019-24 Final Determination

Operating and capital expenditure has been extracted from SAP via TM1 and/or BI for 2019/20 according to profit centre mapping for each cost category for standard control services and alternative control services.

Network overheads include both operating and capital expenditure and are extracted from the SAP financial system using TM1 and BI.

There has been no change in Ausgrid's capitalisation policy in 2019/20.

Assumptions:

N/A

Use of Estimated Information

No estimates reported in template 2.10(A).

Reliability of Information

N/A

Table 2.10.2 - CORPORATE OVERHEADS EXPENDITURE

Compliance with Requirements of the Notice

Actual data for 2019/20 has been based on an extraction of actual financial data directly or via TM1 from our SAP financial system. Information reported in table 2.10.2 aligns with Ausgrid's CAM.

Source of Information

Actual data for 2019/20 is from TM1 and/or SAP BI (Ausgrid financial reporting system).

Methodology & Assumptions

The split of overhead costs between network and corporate overheads is based on mapping of RIN categories used in Ausgrid's 2019 -24 Final Determination.

Operating expenditure is from SAP via the TM1 cube for 2019/20 and is based on the profit centres mapped for corporate overheads and relating to standard control services.

Corporate overheads and capitalised corporate overheads are extracted from the SAP financial system using TM1 and BI.

Assumptions:

N/A

Use of Estimated Information

No estimates reported in template 2.10(A).

Reliability of Information

N/A

Template - 2.11 Labour

Table 2.11.1 - COST METRICS PER ANNUM

Compliance with Requirements of the Notice

All financial costs for 2019/20 financial year have been allocated as per principles set out in Ausgrid's CAM. The actual labour expenditure provided is based on an extraction of actual financial and labour data from the Chris 21 and SAP financial system.

The information provided in table 2.11.1 and 2.11.2 is in line with the requirements in RIN Schedule 1, APPENDIX E: PRINCIPLES AND REQUIREMENTS.

Total labour expenditure included in table 2.11.1 is as per the Labour Cost definition included in Appendix F: Definitions. As per the definition labour costs include:

- Labour hire,
- ordinary time earnings,
- other earnings, on-costs and taxes,
- superannuation,
- termination and redundancy payments,
- purchase of protective clothing,
- training and study assistance; and
- specific employee related FBT taxes.

The segregation of Ausgrid employees into direct labour, network overheads and corporate overheads has been determined according to the job category and cost centres recorded against the employee in the Chris 21 payroll system.

Source of Information

Type of information per AER	Source
Average Staffing Level	Actual hours against Salary codes from Chris 21 divided by 1,877.1 hrs per year based on 52.14 weeks per year and 36 hours standard week. Data is sourced from Chris 21.

Average productive hours	Total hrs booked against Normal & Overtime codes for 2019/20 divided by ASL from Chris 21.
Stand down occurrences	Total Stand - Down instances per ASL from SAP.
Average productive work hour overtime	Total hrs booked against overtime codes for 2019/20 divided by ASL from Chris 21.

Methodology & Assumptions

ASL by Labour Classification

Total staffing level is calculated using actual hours against Salary codes from Chris 21 divided by average hours per year based on 52.14 weeks per year and 36 hours standard week. This data is sourced from SAP HR. The employee data is held in Ausgrid's SAP HR System by 'Job Family' and these have been mapped to the relevant AER classifications. The mapping is shown below. The number of FTEs working on standard control services has been calculated based on the Ausgrid CAM by using the FTE allocation (or FTE split) for 2019/20.

AER Classification	**Ausgrid Job Family / Job Category**
Executive Manager	Executive (level 2 & 3 managers)
Senior Manager	Level 4 managers
Manager	Field Managers Field Supervisors Managers
Professional	Engineering Management / Professional Job Family (less Managers - Job Category)
Semi professional	Engineering Officers Field Support Officers Business Services Environment

	Metering Technology Work Scheduler Trainers Community Engagement Estimators Security
Support Staff	Administration
Intern, junior staff, apprentice	Trainees Work Experience Cadets Graduates
Skilled electrical worker	Base Field - Electrical Workers Advanced Field - Electrical Workers
Skilled non-electrical worker	Workshop Technician
Apprentice	Apprentices - Electricians Apprentices - Overhead Apprentices - Underground
Unskilled worker	Base Field - Asset Access Base Field - Electricity Supply Officer (ESO)

The labour classification in this template are in line with the AER requirements.

Ordinary time include ordinary time salaries and wages booked against salary code for 2019/20, excluding overtime. It also includes allowances, bonuses, incentive payments and superannuation.

Ordinary time expenditure has been extracted from Ausgrid's Chris 21 payroll system. Ordinary time expenditure attributable to standard control services has been calculated by using the FTE allocation rate for 2019/20.

Average Productive Hours per ASL

Actual Available Hours has been used to calculate the quantum of productive hours. Per the AER definition of productive hours, we have deemed that using actual available hours was appropriate after excluding assumptions such as sick leave, annual leave, roster days off and public holidays.

Stand Down Occurrences

Data has been extracted directly from SAP with each 'stand down' instance obtained year by year from Cross Application Time Sheet (CATS), and employees crossed referenced to allocate to labour classifications.

Assumptions:

N/A

Use of Estimated Information

All information provided is based on actual data.

Reliability of Information

N/A

Table 2.11.2 - EXTRA DESCRIPTOR METRICS FOR CURRENT YEAR

Compliance with Requirements of the Notice

The information provided in table 2.11.2 is in line with the requirements and definitions in the RIN.

Source of Information

Type of information per AER	Source
Average productive work hours - ordinary time - per ASL	Total hrs booked against Salary code for 2019/20 divided by ASL. Source data from Chris 21.
Average productive work hours - ordinary time - Hourly Rate per ASL	Total labour cost (excluding overtime cost) + on costs booked against Salary for each category for 2019/20 divided by ASL multiplied by average productive work hours per ASL. Source data has been obtained from Chris 21.
Average productive work hours - overtime time - per ASL	Total hours booked against overtime codes for 2019/20 divided by ASL. Source data from Chris 21.
Average productive work hours - overtime time - Hourly Rate per ASL	Total Overtime costs for 2019/20 each category divided by ASL multiplied by average productive work hours overtime per ASL. Source data from Chris 21.

Methodology & Assumptions

Average productive hours per ASL is calculated using total hrs booked against Normal & Overtime Codes codes for FY 19/20 divided by ASL. The source data is from Chris 21 and SAP HR.

Total Overtime hours incurred for 2019/20 was sourced directly from CHRIS 21 payroll, and using cross references to job families mapped to labour classification. This figure was then divided by ASL for that classification.

Total Overtime dollars were extracted from the Chris 21 payroll system, and using cross references to job families mapped to labour classification. The dollars were then divided by the hours to provide the hourly rate.

Assumptions:

N/A

Use of Estimated Information

All information provided is based on actual data.

Reliability of Information

N/A

Template - 2.12 Input Tables

Table 2.12 INPUT TABLES 1

Compliance with Requirements of the Notice

Source of Information

Specific details of the exact source of information for the expenditure category in template 2.12 are shown below:

- Vegetation management: SAP via TM1 data extraction for operating expenditure [no capital expenditure under this category];
- Routine maintenance: SAP via BO data extraction for operating expenditure [no capital expenditure under this category];
- Non-Routine maintenance: SAP via BO data extraction for operating expenditure [no capital expenditure under this category].

Methodology & Assumptions

The methodology used to calculate information in template 2.12 is discussed below. Definitions applicable to template 2.12 are from the AER's CA RIN guidelines.

Direct costs - operating expenditure directly attributable to a work activity, project or work order, consists of in-house costs of direct labour, direct materials, contractor costs, and other costs excluding any allocated overhead expenditure.

Direct labour cost - labour cost attributable to a specific asset or service, cost centre, work activity, project or work order.

Labour cost definition used in template 2.12 is as per the definition included in Appendix F: Definitions of the CA RIN and include the following:

- Labour hire,
- ordinary time earnings,
- other earnings, on-costs and taxes,
- superannuation,
- termination and redundancy payments,

- purchase of protective clothing,
- training and study assistance; and
- specific employee related FBT taxes.

Other earnings include termination and redundancy payments, purchase of protective clothing, training and study assistance as per the AER definition.

- Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

Use of Estimated Information

Reliability of Information

Table 2.12 INPUT TABLES 2

Compliance with Requirements of the Notice

Actual data for 2019/20 is based on actual financial data directly or via TM1 reports from Ausgrid's SAP financial system for operating expenditure and SAP Business Intelligence system (BI) for capital expenditure. Direct materials, direct labour and contract expenditure are shown excluding of overhead costs and indirect cost allocations to provide a direct cost view for templates 2.2 to 2.9. This is as per Appendix E of the Category Analysis RIN, paragraph 1.15. Other expenditure includes both direct and indirect costs.

Functions/cost groupings listed below shows direct costs in template 2.12

- Vegetation management
- Routine maintenance
- Non-routine maintenance
- Augmentation
- Replacement
- Connections
- Emergency response
- Non network expenditure

Functions/cost groupings listed below shows total costs in template 2.12 (ie. include overhead costs and indirect cost allocations)

- Public lighting
- Fee based services
- Quoted services
- Overheads

Source of Information

Specific details of the exact source of information for the expenditure category in template 2.12 are shown in the below table:

Expense Category	Source
Vegetation management	SAP via TM1 data extraction for operating expenditure [no capital expenditure under this category]
Routine maintenance	SAP via TM1 data extraction for operating expenditure [no capital expenditure under this category]
Non-Routine maintenance	SAP via TM1 data extraction for operating expenditure [no capital expenditure under this category]
Overheads	SAP via TM1 data extraction for operating expenditure and BI data extraction for capital expenditure
Augmentation	SAP via BI data extraction for capital expenditure [no operating expenditure under this category]
Connections	SAP via BI data extraction for capital expenditure [no operating expenditure under this category]
Emergency response	SAP via TM1 data extraction for operating expenditure [no capital expenditure under this category]
Public lighting	SAP via TM1 data extraction for operating expenditure and BI data extraction for capital expenditure
Metering	SAP via TM1 data extraction for operating expenditure and BI data extraction for capital expenditure
Fee-based services	SAP via TM1 data extraction for operating expenditure and BI data extraction for capital expenditure
Quoted services	SAP via TM1 data extraction for operating

	expenditure and BI data extraction for capital expenditure
Replacement	SAP via BI data extraction for capital expenditure [no operating expenditure under this category]
Non-network expenditure	SAP via TM1 data extraction for operating expenditure and BI data extraction for capital expenditure

Methodology & Assumptions

Costs reported in template 2.12 relating to overheads include both operating and capital expenditure for standard control and alternative control services only. Overhead costs relating to unregulated services reported in template 2.10(A) has not been included in template 2.12. The methodology used to calculate information in template 2.12 is discussed below. Definitions applicable to template 2.12 are from the AER's CA RIN guidelines.

Direct costs - operating or capital expenditure directly attributable to a work activity, project or work order, consists of in-house costs of direct labour, direct materials, contractor costs, and other costs excluding any allocated overhead expenditure.

Direct labour cost - labour cost attributable to a specific asset or service, cost centre, work activity, project or work order.

Labour cost definition used in template 2.12 is as per the definition included in Appendix F: Definitions of the CA RIN and include the following:

- Labour hire,
- ordinary time earnings,
- other earnings, on-costs and taxes,
- superannuation,
- termination and redundancy payments,
- purchase of protective clothing,
- training and study assistance; and
- specific employee related FBT taxes.

Other earnings include termination and redundancy payments, purchase of protective clothing, training and study assistance as per the AER definition.

Overhead expenditure in template 2.12 is divided into network and corporate overheads. Network and corporate overheads include operating and capital expenditure. The methodology used to calculate direct labour, material, contract and other expenditure is discussed below.

Expenditure is obtained from SAP via the TM1 cube for the 2019/20 financial year according to the profit centre mapping for the expenditure categories reported in template 2.10 Overheads by the following cost groupings:

- LOB-OPEX: Total Opex (excluding costs for maintenance - considered to be direct costs)
- LOB-LABOUR: Labour costs (excluding any allocated overheads)
- LOB- MAT: Materials
- LOB-CONT: Contractors

Direct labour definition used in overheads costs in template 2.12 is as per AER's labour cost definition excluding labour overhead allocations but including the following cost elements:

- Protective clothing
- Contracted services - labour hire
- MV licences employees
- Fringe Benefits Tax
- Training and staff development
- Redundancy expenses

Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

The adjusted cost profile for opex is then used to split total opex overhead costs for standard control and alternative control services. (ie. total overhead costs split based on a percentage allocation).

Capital expenditure

Costs were extracted from SAP via the BI reporting system for the 2019/20 financial year. The cost groupings used in BI are:

PM/PS_DIR: total direct costs, which comprises:

- PM/PS_LAB - direct labour
- PM/PS_MAT - direct material
- PM/PS_SRV - contract services
- PM/PS_OTHER - other direct costs

PM/PS_INDIR: total indirect costs, which comprises:

- PMPS_LABIN: indirect labour
- PMPS_OVER: indirect other overhead

Direct Labour definition used in template 2.12 is as per AER's labour cost definition excluding labour overhead allocations but including the following cost elements:

- Protective clothing
- Contracted services - labour hire
- MV licences employees
- Training and staff development

The above cost elements included in labour are in accordance with the AER definition stated in Appendix F Definitions of the Category Analysis RIN requirements dated 07 March 2014.

Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

The adjusted cost profile for capex is then used to split total capex overhead costs for standard control and alternative control services (ie. total overhead costs split based on a percentage allocation).

Public Lighting expenditure split for 2.12

Operating expenditure

The method used to calculate direct labour, direct material, contract and other expenditure for Public Lighting is as follows:

- LOB-OPEX: Total opex
- LOB-LABOUR: Labour costs (excluding any allocated overhead)
- LOB- MAT: Materials
- LOB-CONT: Contractors

Direct labour also includes:

- Protective clothing
- Contracted services - labour hire
- MV licences employees
- Fringe Benefits Tax
- Training and staff development
- Redundancy expenses

Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

Capital expenditure

Costs were extracted from SAP via the BI reporting system for the 2018/19 financial year. The cost groupings used in BI are:

PM/PS_DIR: total direct costs, which comprises:

- PM/PS_LAB - direct labour
- PM/PS_MAT - direct material

- PM/PS_SRV - contract services
- PM/PS_OTHER - other direct costs

PM/PS_INDIR: total indirect costs, which comprises:

- PMPS_LABIN: indirect labour
- PMPS_OVER: indirect other overhead

Direct Labour definition used for Public Lighting expenditure in template 2.12 is as per AER's labour cost definition excluding labour overhead allocations but including the following cost elements:

- Protective clothing
- Contracted services - labour hire
- MV licences employees
- Training and staff development

The above cost elements included in labour are in accordance with the AER definition stated in Appendix F Definitions of the Category Analysis RIN requirements dated 07 March 2014.

Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

Non-network expenditure split for 2.12

Operating expenditure

The method used to calculate direct labour, direct material, contract and other expenditure for Public Lighting is as follows:

- LOB-OPEX: Total opex
- LOB-LABOUR: Labour costs (excluding any allocated overhead)
- LOB- MAT: Materials
- LOB-CONT: Contractors

Direct labour also includes:

- Protective clothing
- Contracted services - labour hire
- MV licences employees
- FBT Taxes
- Training and staff development
- Redundancy expenses

Direct materials costs is LOB - MAT less protective clothing which is categorised under direct labour.

Contract expenditure is LOB-CONT less contracted services labour hire which is categorised under direct labour.

Other Expenditure is all other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract expenditure.

Capital expenditure

Costs were extracted from SAP via the BI reporting system for the 2019/20 financial year. The cost groupings in BI used to populate direct material, direct labour, contract and other expenditure are:

PM/PS_DIR: total direct costs, which comprises:

- PM/PS_LAB - direct labour
- PM/PS_MAT - direct material
- PM/PS_SRV - contract services
- PM/PS_OTHER - other direct costs

PM/PS_INDIR: total indirect costs, which comprises:

- PMPS_LABIN: indirect labour
- PMPS_OVER: indirect other overhead

Direct labour also includes:

- Protective clothing

- Contracted services - labour hire
- MV licences employees
- Training and staff development

The above cost elements included in labour are in accordance with the AER definition stated in Appendix F Definitions of the Category Analysis RIN requirements dated 07 March 2014.

- Direct Materials = PM/PS_MAT less Protective clothing which is categorised as Direct labour above
- Contract = PM/PS_SRV less Contracted services - labour hire which is categorised as Direct labour above
- Other Expenditure = All other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract mentioned above.

Augmentation split for 2.12

Capital expenditure

Costs were extracted from SAP via the BI reporting system for the 2018/19 financial year. The cost groupings in BI used to populate direct material, direct labour, contract and other expenditure are:

PM/PS_DIR: total direct costs, which comprises:

- PM/PS_LAB - direct labour
- PM/PS_MAT - direct material
- PM/PS_SRV - contract services
- PM/PS_OTHER - other direct costs

PM/PS_INDIR: total indirect costs, which comprises:

- PMPS_LABIN: indirect labour
- PMPS_OVER: indirect other overhead

Direct labour also includes:

- Protective clothing
- Contracted services - labour hire

- Course fees

The above cost elements included in labour are in accordance with the AER definition stated in Appendix F Definitions of the Category Analysis RIN requirements dated 07 March 2014.

- Direct Materials = PM/PS_MAT less Protective clothing which is categorised as Direct labour above
- Contract = PM/PS_SRV less Contracted services - labour hire which is categorised as Direct labour above
- Other Expenditure = All other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract mentioned above.

Replacement split for 2.12

Capital expenditure

Costs were extracted from SAP via the BI reporting system for the 2018/19 financial year. The cost groupings in BI used to populate direct material, direct labour, contract and other expenditure are:

PM/PS_DIR: total direct costs, which comprises:

- PM/PS_LAB - direct labour
- PM/PS_MAT - direct material
- PM/PS_SRV - contract services
- PM/PS_OTHER - other direct costs

PM/PS_INDIR: total indirect costs, which comprises:

- PMPS_LABIN: indirect labour
- PMPS_OVER: indirect other overhead

Direct labour also includes:

- Protective clothing
- Contracted services - labour hire
- Course fees
- Training costs

The above cost elements included in labour are in accordance with the AER definition stated in Appendix F Definitions of the Category Analysis RIN requirements dated 07 March 2014.

- Direct Materials = PM/PS_MAT less Protective clothing which is categorised as Direct labour above
- Contract = PM/PS_SRV less Contracted services - labour hire which is categorised as Direct labour above
- Other Expenditure = All other expenditure (i.e. vehicle expenditure, IT expenditure, professional/licences, rent expenditure, postage & printing costs, etc.) less cost items reported under direct labour, direct material and contract mentioned above.

Assumptions:

N/A

Use of Estimated Information

Only emergency responses have estimated data in template 2.12. For the reason, please refer to basis of preparation for 2.9 Emergency Responses.

Reliability of Information

N/A

Template - 4.1 Public Lighting

Table 4.1.1 - DESCRIPTOR METRICS OVER YEAR

Compliance with Requirements of the Notice

The information provided in template 4.1 has been completed in accordance with the AER RIN requirements and instructions applying to template 4.1 including Appendix E and F, and the requirements in the worksheet.

Source of Information

4.1.1 - Descriptor Metrics Over Year

The Source of data is initially entered into the SAP PM (Plant Maintenance) database and then automatically placed into the Business Objects Universe on a nightly basis. A Business Objects Report was then executed to extract the street lighting inventory. The street lighting inventory included Rate 1, 2, 4 and 5 and all active lights that had a commissioned date less than or equal to the 19/20 financial period.

Methodology & Assumptions

4.1.1 - Descriptor Metrics Over Year

Business Objects is a reporting tool that connects directly to the SAP PM database. Business Objects allows conditions to be specified when constructing the query in order to extract the required information.

The conditions specified included where the street light Rate is equal to 1, 2, 4 or 5. Also to only include active street lights that have a commissioned date less than or equal to the 19/20 financial period.

Rate 1 - Ausgrid fully funded and maintained

Rate 2 - Ausgrid maintained

Rate 3 - Privately funded and maintained (These were excluded from the count)

Rate 4 - Ausgrid part funded and maintained

Rate 5 - Ausgrid part funded and maintained

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 4.1.2 - DESCRIPTOR METRICS ANNUALLY

Compliance with Requirements of the Notice

Responses provided in table 4.1.2 for Public Lighting have been compliant with the requirements of the Notice.

This includes:

- Schedule 1: 15 - Public Lighting Alternative Control Services
- Appendix E: 21 - Public Lighting Alternative Control Services
- Appendix E: 1 - General principles and requirements

Source of Information

4.1.2 - Descriptor Metrics Annually

The Source of data is initially entered into the SAP PM (Plant Maintenance) database and then automatically placed into the Business Objects Universe on a nightly basis.

Methodology & Assumptions

LIGHT INSTALLATION

Major and Minor

Using the Business Objects Universe, a report was executed to extract all Rate 1, 2, 4 and 5 street lights that had a "commissioned date" that fell within the 2019/20 financial year. The street lights were then separated into Major being V category, typically being on arterial roads and Minor being P category, typically being on residential roads. The V and P category was determined by the lamp Wattage, 100 Watt and over were categorised as Major road light installation, while under 100 Watt were categorised as Minor road light installation.

Number of poles installed

Using the Business Objects Universe, a report was executed to extract all Rate 1, 2, 4 and 5 street lights that had a "commissioned date" that fell within the 2019/20 financial year and a support type which was a "dedicated street light support".

LIGHT REPLACEMENT

Major and Minor

Using the Business Objects Universe, a report was executed to extract all ML M2 M3 M4 M5 and M7 notifications that were completed within the 2019/20 financial year and had an "Object Part Desc" as "Luminaire". All Luminaire Replacement jobs should have an associated Notification with the "Object Part Desc" as "Luminaire". The street lights were then separated into Major being V category, typically being on arterial roads and Minor being P Category, typically being on residential roads. The V and P category was determined by lamp Wattage, 100 Watt and over were categorised as Major road light installation, while under 100 Watt were categorised as Minor road light installation.

Number of pole replaced

Using the Business Objects Universe, a report was executed to extract all Rate 1, 2, 4 and 5 street lights that had a support effective date that fell within the 2019/20 financial year and a support type which was a "dedicated street light support". If the "support effective date" was greater than the "commissioned date" then this will indicate a pole replacement. Note: If the "support effective date" was equal to the "commissioned date" then this will indicate installation of a new street light and pole, and not a replacement of the existing pole.

LIGHT MAINTENANCE

Major and Minor

Using the Business Objects Universe, a report was executed to extract all M1 notifications that were closed during the 2019/20 financial year. Also a report was run to extract all ML, M2, M3, M4 and M5 that did not have an "Object Park Desc" of "Luminaire" as these records would have been captured in the M1 notification report. These amounts were added to determine the total number of Light Maintenance jobs that occurred. The street lights were then separated into Major being V category, typically being on arterial roads and Minor being P Category, typically being on residential roads. The V and P category was determined by lamp Wattage, 100 Watt and over were categorised as Major road light installation, while under 100 Watt were categorised as Minor road light installation.

Number of poles installed

This value represents the total number of Rate 1, 2, 4 and 5 street lights within Ausgrid's network. The Source data is initially entered into the SAP PM (Plant Maintenance) database. A Business Objects Report was used to extract the information.

QUALITY OF SUPPLY

Mean days to rectify/replace public lighting assets

Using the Business Objects Universe, a report was executed to extract all customer raised street lighting jobs that occurred during the 2019/20 financial year. A customer street lighting job raised in FY20 can be

identified by having a Reported Date that falls within the 2019/20 financial year and a notification type of "ML". We have reported on the average repair time for "General Fault" jobs. We then calculating the number of days between the Reported Date and Completion Date to determine the response time to complete the job. For this calculation we excluded weekends and public holidays. We also excluded street lighting jobs that were effected by a Major Storm incident or if it was considered to be a Condemned Pole. By using this calculation we determined the average number of days to repair a street light fault. This was the same method used for our FY20 annual report to IPART.

GSL breaches

This number represents the streetlight GSL claims that were processed by the contract centre in FY20. The number was provided by Nathan McMahon from Customer and Strategy.

GSL payment

The total count of GSL Breaches was multiplied by $25

Customer complaints

This information was extracted from the CRM system. This was provided by Alex Sanderson from Customer and Strategy.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 4.1.3 - COST METRICS

Compliance with Requirements of the Notice

Responses provided in Table 4.1.2 for Public Lighting have been compliant with the requirements of the Notice. This includes:

Schedule 1: 15 - Public Lighting Alternative Control Services

Appendix E: 21 - Public Lighting Alternative Control Services

Appendix E: 1 - General principles and requirements

Source of Information

All costs have been sourced from the relevant AER determination (approved Ausgrid's Public Lighting regulatory pricing models). Light Installation and Light Replacement costs are sourced from Ausgrid's Post 2009 annuity model, Light Maintenance costs are sourced from Ausgrid's Maintenance charge model.

Methodology & Assumptions

Light Installation Costs listed are the modelled costs to install each of the luminaire types. Cost includes materials, labour, and overheads. All assumptions are listed in the model. Light Replacement There is no difference in cost for Light Installation and Light Replacement. These figures are duplicated from Light Installation. Lighting Maintenance These costs are the output of Ausgrid's operational expenditure pricing model. These costs take into consideration all scheduled and unscheduled maintenance associated with each asset and pricing of all associated materials required for the maintenance of these assets. This model forms part of Ausgrid's public lighting substantive proposal. All underlying assumptions for these calculations can be found in this model.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Template - 4.2 Metering

Table 4.2.1 - METERING DESCRIPTOR METRIC

Compliance with Requirements of the Notice

The response to table '4.2.1 Metering descriptor metric' utilised the AER response worksheets provided. This submission complies with the relevant sections of the RIN and costs have been derived in accordance with Ausgrid's reporting methodology and operational quantities are drawn from the appropriate Ausgrid database.

Source of Information

2019/20 volumes were obtained from Ausgrid's Metering Business System (MBS). *Meter population figures are as at 30 June 2020.* Asset sub-categories volumes are based on FY19 estimated proportion of total volumes.

Methodology & Assumptions

The process of populating this RIN utilised a centrally managed approach. The business process owner coordinated the inputs that were supplied by subject matter experts and management teams. A feedback loop was also incorporated to allow the Manager to verify the accuracy of the supplied information (including source data) and this notice was prepared in accordance with the methodology utilised in AER 2019-24 Regulatory Submission.

The response to table **4.2.1 Metering Descriptor Metric** is based upon a number of assumptions. These are detailed below:

- **Tables 4.2.1 (Meter Type 4)** - Relates to Contestable Meter Sites (Type 1-4). These sites are already open to competition and deemed not to be part of this regulatory submission, therefore all entries have been set to zero in this template.
- **Table 4.2.1 (Meter Type 5 & Meter Type 6)** - Type 5 & 6 meters for this table are defined as installed populations only (based upon how a site is registered/classified in the national electricity market). The volume is a count of meters. This volume includes some NEM registered type 5 sites that have aspects of AMI or Type 4 style communications implemented for operational reasons. i.e. chronic access.

<u>Assumptions:</u>

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 4.2.2 - COST METRICS

Compliance with Requirements of the Notice

The response to table '4.2.2 Cost metrics' utilised the AER response worksheets provided. This submission complies with the relevant sections of the RIN and costs have been derived in accordance with Ausgrid's financial methodology and operational quantities are drawn from the appropriate Ausgrid databases.

Source of Information

2019/20 costs are actual and were identified from Financial Internal Order (I/O) reports and analysis derived by Ausgrid's Finance and Compliance - Commercial Finance Team

Total metering costs are considered to be the costs captured against IO's directly attributable to the activities contained within this template. These costs have been extracted from our financial system (SAP) from the TM1 reporting system. For contracted services costs, a breakdown of each sub-service category was supplied by the provider.

For 2019/20, actual volumes were extracted from Ausgrid's Metering Business System database and SAP system. Asset sub-categories volumes are based on FY19 estimated proportion of the total volumes

Methodology & Assumptions

The process of populating this RIN utilised a centrally managed approach. The business process owner coordinated the inputs that were supplied by subject matter experts and management teams. A feedback loop was also incorporated to allow the Manager to verify the accuracy of the supplied information (including source data) and this notice was prepared in accordance with the methodology utilised in AER 2019-24 Regulatory Submission.

The response to table 4.2.2 Cost Metrics (Cost & Volume) is based upon a number of assumptions. These are detailed below:

- Table 4.2.2 (General Comment) - For this table, volumes and expenditure include metering as an Alternate Control Service (ACS) but does not include Fee-Based (Ancillary Network Services - ANS) services as these services are documented separately in worksheet 4.3. Ausgrid's metering group also undertakes some activities that are related to Standard Control Services (SCS) that are also not included in 4.2.2. Examples include monitoring statistical metering related to transmission and distribution substations, validating incoming data from other metering providers for the purposes of network billing.

- Tables 4.2.2 (Meter Type 4) - Relates to Contestable Meter Sites (Type 1-4). These sites are already open to competition and deemed not to be part of this regulatory submission, therefore all entries have been set to zero in this template.
- Table 4.2.2 (Meter Purchase, New Meter Installation, Meter Replacement) **-** No Expenditure or volumes are required as this activity is now a contestable metering service.
- Table 4.2.2 (Meter Purchase) - No Expenditure or volumes are required as this activity is now a contestable metering service.
- Table 4.2.2 (Meter Testing - Meter Type 5 & Meter Type 6) - Meter Testing is defined as Sample Meter Testing. Financial and volume based data for Type 5 and Type 6 sites has been combined as there has been significant merging of work associated with Type 5 and Type 6 sites making accurate apportionment difficult between testing Interval Meters and Accumulation meters. For example; a site tested as Type 6 and then upgraded to Type 5 could have been captured as a Type 5 cost and quantity. Therefore for the indicated periods, Type 5 meter tests also include Type 6 meter tests at a NMI level. 2019/20 actual costs were identified from the contracted services provider . Sample Meter testing volumes are calculated on a per NMI basis and volumes were extracted via the Metering Business System database.
- Retailer requested meter tests - identified as ZMET_ ANS Service Orders have been excluded, as it is an Ancillary Network Service and documented separately in worksheet 4.3 Fee-based services.
- Table 4.2.2 (Meter Investigation - Meter Type 5 & Meter Type 6) - The value in the cell for Type 5 meter investigation also includes Type 6 meter investigations as we are unable to separate meter investigation into separate categories. 2018/19 actual costs were identified from the contracted services provider. Meter Investigation volumes are calculated on a per NMI basis and volumes were obtained via the Metering Business System database.
- Table 4.2.2 (Scheduled Meter Reading) - Scheduled means routine meter reads (including either monthly or quarterly read cycles). Scheduled Meter reading actual volumes for Type 5 & Type 6 metering are recorded on a per NMI basis and were obtained from Ausgrid's MBS database. 2019/20 actual costs were identified from Financial Internal Order (I/O) reports. The costs were then allocated across Type 5 and Type 6 scheduled meter readings based on a weighted allocation of the unit cost. The cost is calculated per read, and excludes Ancillary Network Services i.e. Special Meter Reading & Move In/Out meter reads (MIMO) which are detailed separately in worksheet 4.3.1 Fee-based services.

- Table 4.2.2 (Special Meter Reading - Meter Type 5 & Meter Type 6) - Special Meter Reading is defined as special reads/off cycle meter reads that are initiated by the network for the purpose of quality assurance and other scheduled meter reading related activities. The values in the cell for Type 5 costs and volumes represent the sum of both Type 5 & Type 6 'special meter reading' activities as we are unable to split costs/volumes by the separate meter categories. 2019/20 actual costs were identified from the contracted services provider . Special Meter Reading volumes were calculated on a per NMI basis and volumes were extracted via the Metering Business System database. For Type 5 meters removed from a site prior to an actual final reading being obtained, Ausgrid have established a process to obtain readings from these removed meters and also uploaded to the Metering Business System database. The costs for type 5 meters removed have been classified as part of other metering rather than a standard special read.

Retailer requested, Special Meter Reads/MIMO Reads have been excluded, as it is an ancillary network service (ANS) therefore costs and volumes are contained in worksheet 4.3.1 Fee-Based Services.

- Table 4.2.2 (New Meter Installation - Meter Type 5 & Meter Type 6) - No Expenditure or volumes are required as this activity is now a contestable metering service.
- Table 4.2.2 (Meter Replacements - Meter Type 5) - No Expenditure or volumes are required as this activity is now a contestable metering service.
- Table 4.2.2 (Meter Maintenance - Meter Type 5 & Type 6) **-** Indicates field meter maintenance tasks excluding Meter Investigation and Meter Testing, detailed elsewhere in sections 4.2.2 and 4.3.1 of this document.

The values in the cell for Type 5 volume and costs represent the sum of both Type 5 & Type 6 meter maintenance activity on a per NMI basis (unable to separate meter maintenance into separate categories). 2019/20 actual costs were identified from the contracted services provider. Actual volumes for Meter Maintenance were calculated on a per NMI basis and were obtained via SSDM reporting database.

- Table 4.2.2 (Other Metering - Meter Type 5) - The recorded expenditure comprises is comprised of Meter Data Processing and Distribution, Metering Technology and Engineering Support relating to metering Alternate Control Service and non-system capex reflect allocation of non-network capital expenditure to metering in accordance with Ausgrid's Cost Allocation Methodology.

The value in the cell for Type 5 costs represents the sum of both Type 5 & Type 6 'Other metering' activities (unable to split costs into separate categories). 2018/19 actual costs were identified from the

contracted services provider. As this category has a combination of qualitative and quantitative activities, no volumes were recorded in this template.

- Table 4.2.2 (Other Metering - Meter Type 7)

It is noted that there are no Type 7 physical meters in Ausgrid's network; therefore no volume has been recorded.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Template - 4.3 Fee-Based Services

Table 4.3.1 - COST METRICS FOR FEE-BASED SERVICES

Compliance with Requirements of the Notice

The information provided on table 4.3.1 is consistent with the requirements in the RIN. The information is consistent with the definition of Alternative Control Services Fixed Fee provided in Appendix F of the RIN.

The information has been prepared to align with the requirements of Schedule 1, section 1 and Schedule 2, section 1 of the RIN. It also aligns with the principles and requirements outlined in Section 15 of Appendix E - Principles and requirements.

The fees listed in table 4.3.1 reflect the fees listed in Ausgrid's annual tariff proposal. Expenditures reported have not been distinguished as standard or alternative control nor have they been distinguished as Capex or Opex.

This response is based on the same preparation of worksheets and supporting documentation used in the Reset RIN. The information primarily comes from SAP. Where practical, information is provided at sufficiently low level to encapsulate each proposed service. See Ausgrid's Substantive Proposal, our supplementary information 8.22_Ancillary network services proposal_140529.pdf and Attachment 8.24_ID00219_Connection related ANS models_140515.zip for further details from each service model.

Source of Information

The information provided was sourced from Ausgrid's SAP system.

Ausgrid records both expenditure and revenue associated with each service using dedicated internal orders, activity numbers and service orders in its SAP financial system. Volumes of services provided were determined by interrogating revenue billing data. The exception to this was the volume of connection offers which was sourced from SAP Connection Application records and Inspection of service work by level 2 ASPs (NOSW) which was sourced from SAP audit inspection records.

Methodology & Assumptions

The methodology used to populate this RIN table utilised a centrally coordinated approach. Inputs were supplied via management and various subject matter experts (SME) and data analysts to the central point. A checking and feedback loop involving a financial review was also incorporated to ensure the approving manager could verify supplied information and processes aligned to RIN requirements.

In preparing the RIN response for 4.3 Ancillary Services - fee based services, reference was made to various reports obtained from Ausgrid's SAP system.

Expenditure - SAP reporting tools provide expenditure recorded on each of the dedicated internal order, activity numbers and service orders associated with each service fee. For some metering related ANS, expenditures are an amalgamation of costs extracted from multiple orders.

Volumes - The volumes of services provided were determined using one of two methods:-

- Invoicing and revenue data obtained from the Ancillary Services Revenue report is used identify the volume of service fees billed.
- For connection offer volumes only, the volume of connection offers provided was sourced from SAP connection application records using SAP BI reporting (interrogating task code and task start date).
- For inspection of service work by level 2 ASP volumes only, the volume of inspections was sourced from SAP inspection records using the SAP AIS AC Status report (interrogating the number of inspections generated)

Assumptions:

Nil

Use of Estimated Information

No estimated data was used for fee based services

Reliability of Information

Nil

Template - 4.4 Quoted Services

Table 4.4.1 - COST METRICS FOR QUOTED SERVICES

Compliance with Requirements of the Notice

The information provided on table 4.4.1 is consistent with the requirements in the RIN. The information is consistent with the definition of Alternative Control Quoted Services provided in Appendix F of the RIN.

The information has been prepared to align with the requirements of Schedule 1, section 1 and Schedule 2, section 1 of the RIN. It is also aligns with the principles and requirements outlined in Section 15 of Appendix E - Principles and requirements.

The fees listed in table 4.4.1 are a reflection of the fees listed in Ausgrid's annual tariff proposal. Expenditures reported have not been distinguished as standard or alternative control nor have they been distinguished as Capex or Opex.

This response is based on the same preparation of worksheets and supporting documentation used in the Reset RIN. The information primarily comes from SAP. Where practical, information is provided at sufficiently low level to encapsulate each proposed service. See Ausgrid's Substantive Proposal, our supplementary information 8.22_Ancillary network services proposal_140529.pdf and Attachment 8.24_ID00219_Connection related ANS models_140515.zip for further details from each service model.

Source of Information

The information provided was sourced from Ausgrid's SAP system.

Ausgrid records both expenditure and revenue associated with each service using dedicated internal orders and activity numbers in its SAP financial system. Volumes of services provided were determined by interrogating revenue billing data. The exception to this was the volume of connection offers which was sourced from SAP Connection Application records.

Methodology & Assumptions

The methodology used to populate this RIN table utilised a centrally coordinated approach. Inputs were supplied via management and various subject matter experts (SME) and data analysts to the central point. A checking and feedback loop involving a financial review was also incorporated to ensure the approving manager could verify supplied information and processes aligned to RIN requirements.

In preparing the RIN response for 4.4 Ancillary Services - quoted services, reference was made to various reports obtained from Ausgrid's SAP system.

Expenditure - The Ancillary Network Services report provides expenditure recorded on each of the dedicated internal orders, activity numbers and service orders associated with each service fee. Corporate allocations have been included as a separate listed item where applicable.

Volumes - The volumes of services provided were determined using one of two methods:-

- Invoicing and revenue data obtained from the Ancillary Services Revenue report is used identify the volume of service fees billed.
- For connection offer volumes only, the volume of connection offers provided was sourced from SAP connection application records using the SAP BI reporting (interrogating task code and task start date).

Assumptions:

Nil

Use of Estimated Information

No estimated data was used for quoted services

Reliability of Information

Nil

Template - 5.2 Asset Age Profile

Table 5.2.1 - ASSET AGE PROFILE

Compliance with Requirements of the Notice

Ausgrid sources records from asset systems which to the best of our knowledge reflects actuals. Updating of these asset systems is maintained through governance processes. Where data is not available or requires review, best estimates are provided.

Source of Information

Source	Asset Category
SAP Plant Maintenance	Poles, Transformers, Switchgear, Public Lighting, SCADA (Field Devices, AFLC, Other), Substations, Towers, Voltage Regulator, Underground Cable (Other), Communication Site Infrastructure
GIS	Overhead conductor, Underground cable, Linear Assets
MBS	Service lines
PNI	SCADA (Communications Linear Assets)
Equipment Acquisition data	Master Station Assets
DARTS	SCADA (Local Network Wiring Asset)

If the commissioned date of an asset is prior to the RIN template (e.g. 1909), the quantity of asset will be populated/added into the last available column (e.g.1911-1912). Depending on the asset, this maybe potentially a data issue recorded in the system.

Methodology & Assumptions

General Methodology for Economic Life and Std Deviation

Ausgrid has, in most cases, applied a sampling approach to determine the economic life and standard deviation of asset populations. This approach uses the age at retirement of a sample of assets retired in recent years, typically five years, to determine the average and standard deviation. Only assets with recorded commissioning and decommissioning dates are used to ensure accuracy. The sample is

restricted to more recent years (eg. past 5 years where applicable) as data accuracy is higher and to ensure that the results reflect current asset management approaches. If no assets were decommissioned in the 5 year period or the sample size prevents an accurate calculation of the economic life, the economic life from the previous RIN was used or the asset with similar characteristics like voltage is used..

Asset Category	Methodology
Poles	To provide the age profile information, an extract was obtained from SAP Business Objects of all commissioned poles, excluding those dedicated to public lighting (Refer to number of public lighting dedicated poles in the Public Lighting data rows). Ausgrid has implemented the methodology of using the voltage of the feeder the poles are attached to. This is now reflected into the SAP corporate system for poles. As direct attributes for voltage level are not retained, when poles are retired they lose the attributes in the asset system that allow them to be allocated to a voltage. Thus mean and standard deviation for economic life are grouped by material type only. The primary assumption for data in this category is that approximately half of the pole population has an assumed age based on a suburb age methodology. This is due to the absence of pole discs on most poles pre-1980, and that records of installation were not retained prior to the late 1990's. Whilst this is assumed to provide a relatively good estimate of the global population profile, individual and local population ages can be inaccurate. Additionally, a number of pole records do not have details to be able to categorise them directly into a voltage category. These have been assigned to the <=1kV poles in their corresponding material category. For 'STAKING OF A WOODEN POLE', this is

	assumed to refer to the data for poles that have been reinforced/reinstated with what Ausgrid refers to as a 'nail' or 'splint'. The master data for these assets does not currently contain the date of installation of the nail. However for most assets this can be obtained from the 'notification' data in SAP (i.e. the record of work for the 'nailing' activity).
Overhead conductors	Data for the age profile is extracted from the GIS system. The lengths have been extracted and aggregated by voltage and phases. For lengths of 22kV where the phase is "unknown" this has been assigned in equal proportions to both single-phase and multi-phase categories Conductors that have 'Date Unknown' GIS report has been proportioned between amongst the rest of the years as there are missing conductor information within the Ausgrid network. Data is not retained for removed conductors to allow for the provision of economic life information based on actual data. And as the renewal of overhead conductors have synergies with the renewal of the supporting structures, the mean and standard deviation for all overhead conductor categories is estimated to be the same as for wood poles.
Underground cables	Data for the age profile is extracted from the GIS system. The lengths have been extracted and aggregated by voltage and phases. Data for the 'Other' category includes assets like pits, pillars and UGOHs has been sourced from SAP. Cables that have 'Date Unknown' in the financial year column in the GIS report has been apportioned between amongst the rest of the years as there are missing conductor information within the Ausgrid

	network. Data for economic life mean and standard deviation has been calculated by acquiring a similar report from GIS by selecting lengths of underground cable that have a status of 'abandoned'. Further restrictions on the data used are on decommissioning dates between 1/1/2011 and current RIN reporting year end (e.g. 30/6/2017) and a non-blank commissioning date and decommissioning date. Cable lengths have then been assigned to the relevant category using the 'voltage' column. A weighted average age and corresponding standard deviation has been calculated in the FME software package. UG Cables categorised as 'Other' has miscellaneous ancillary assets (e.g. Pillars, pits, link boxes, ISO Cabinets, Cabinets) that has an asset group category of DMUG and TMUG which are distribution and transmission underground assets and owned by Ausgrid only.
Service lines	The age profile for service lines was obtained by extracting services from GIS that are not identified as private installations. Where multiple segments of service line supply the one customer, these are still only counted as one service. This information is merged with customer information retrieved from the Metering Business System (MBS) via the National Metering Identifier (NMI) of the supply point connected to the service line. The customer type attributed to the NMI in MBS was then used to classify the service line allowing distinction of those that are for residential or commercial/industrial connections. Commissioning dates attached to the service line in GIS have been used to determine the

	installation year; however where this data not recorded the corresponding meter installation date in MBS has been used. Where the installation year has been provided as prior to 1912, the count of services has been redistributed to the year 1912. All OH service lines have been classified as simple type as the classification of complex type is related to the actions undertaken during the original connection and thus have no relevance to its classification in situ. Therefore UG service lines have been classified as complex.
Transformers	To obtain the age profile information, extracts of all commissioned transformers including auxiliary transformers were obtained from SAP including attributes on primary voltage, secondary voltage, type of transformer, phases, installation location and year of first commissioning. Using these attributes each commissioned transformer was then allocated to one of the required RIN categories. Data for the 'Other' RIN category combines transformer assets that do not belong in the provided RIN categories and reactive assets like 33kV poletop transformers, reactors, capacitors, current transformers, voltage transformers and transformer bushings. Similarly, the calculation of economic life mean and standard deviation was obtained for all retired (disposed) transformers 5 years prior to the current RIN reporting year end and the same attributes used to assign records to the categories required in the RIN template. The economic life and standard deviation are grouped by the asset type for distribution transformers and voltage for sub-transmission transformers. The sample is restricted

	to more recent years (e.g. past 5 years) as data accuracy is higher and to ensure that the results reflect current asset management approaches. The RIN category mapping is obtained by considering data in key SAP substation fields include object type, operating voltage and rated name-plate ratings.
Switchgear	Data has been extracted from SAP for all equipment that would map to the specified categories, or other switchgear categories that have been defined by Ausgrid. This includes attributes such as object type, operating voltage, location, status, commissioning dates and decommissioning dates. Valid records have then been manually mapped to the defined categories using these attributes. Age profiles for each category are then generated by filtering on Commissioned equipment only. For a couple of categories there are a relatively significant number of records without commissioning dates. Data for 'Other' category combines switchgear assets that do not belong in the provided RIN categories like 22kV/33kV fuse holders and 33kV/66kV links. Data for economic life mean and standard deviation has been obtained using a sample data set based on the retired and decommissioned assets where the decommissioned date was during the last 5 year period. The sample is restricted to more recent years (e.g. past 5 years where applicable) as data accuracy is higher and to ensure that the results reflect current asset management approaches. For a couple of categories there is insufficient data to generate a reliable output, so data from another asset category has been used if it is considered that

	it is representative (e.g. only differs by voltage level).
Public lighting	For age profile information or Luminaires, Lamps and Brackets categories, corresponding data for all commissioned lights (excluding Rate 3 lights which are privately owned and maintained) has been extracted from SAP. Luminaires are divided into major and minor road categories by lights that are typically used on residential roads and arterial roads. This has been delineated by lamp wattage; 100W and less is minor and over 100W is major. With LEDs, LEDs tend to have less than 100W therefore some analysis into the data is required to determine the road category. For age profile information on Poles, data has been extracted from SAP for all commissioned poles that are classified as being solely for public lighting purposes. The pole is linked to the road category by lamp wattage as described for luminaires. Data with 'Unknown' categories were proportioned between the two categories (Major & Minor). The economic life is calculated using the date difference between the streetlight pole retirement date within the last 5 years and the commissioned date of the luminaire/lamp/bracket. Due to streetlight poles with unknown categories, streetlight poles, lamps, luminaires and brackets mean and standard deviation is estimated to be the same for both major and minor categories.
SCADA, network control and protection systems	***Field Devices*** Data was obtained from SAP PM using Business Objects for all Relay, battery and battery chargers, RTU and comm devices type object. An age profile was obtained by using all currently commissioned assets. Data with Unknown commissioning dates

	were proportioned into the final age profile. Economic life mean and standard deviation was obtained using the data of assets retired during the last 5 year period. ***Local Network Wiring Assets*** This data was estimated with further explanation in the next section. Local network wiring data uses a a combination of data from DARTS and SAP. ***Communications Network Assets*** This data was estimated with further explanation in the next section. The assets included in this category are Fibre Patch panels and shelves. ***Master Station Assets*** This data was estimated with further explanation in the next section. ***Communications Site Infrastructure*** Data was obtained from SAP PM for all communication site locations. ***Communications Linear Assets*** The current total length of Optical fibre has been obtained from the PNI database. The profile used in the Reset RIN submission for optical fibre was retained for years up to the previous RIN, but with the total quantity differential being accounted for in the current RIN year. Life and standard deviations are estimated and averaged across a population of approximately 50% ADSS, 25% UGFO and 25% OPGW. This data is then combined with the copper pilots and communications cable data referred to in the 'estimates' section to produce an overall profile and

	economic life information. Due to the lack of source data and minimal changes for optical fibre component, the standard deviation and mean has been estimated to be similar to the previous financial data. ***AFLC*** Data was obtained from SAP PM using Business Objects for all MG_SET and SFU object types. An age profile was obtained by using all currently commissioned assets. Economic life mean and standard deviation was obtained using the data of assets retired during the last 5 year period.
Other	***Distribution Substations and Zone & Subtransmission Substations*** Data for age profiles of this category has been obtained through extracting all commissioned and decommissioned substations from SAP PM. Data for economic life mean and standard deviation utilised the data from SAP PM where a decommissioned or retired status had been set, a valid commissioned date and decommissioned date were available, and where the decommissioned date was during the last 5 year period. Control points are excluded as a part of this RIN category. ***Distribution Voltage Regulation*** Data for age profiles of this category has been obtained through extracting all commissioned and decommissioned voltage regulators from SAP PM. Data for economic life mean and standard deviation utilised the data from SAP PM where the retired status had been set, and a valid commissioned data

	and decommissioned data were available. ***Towers*** Data for the age profile has been extracted from SAP PM via Business Object. Data for the economic life mean and standard deviation has been obtained from towers retired during the last 5 year period. ***Overhead Conductor - Other*** Data for the age profile was extracted from the GIS system. The lengths have been extracted and aggregated by operating voltage (i.e. SL) for overhead streetlighting conductor. Conductors that have 'Date unknown' in the commissioned date, an apportionment was performed and applied to the years with lengths>0. Data is not retained for removed conductors to allow for the provision of economic life information based on actual data. As the renewal of overhead conductors have synergies with the renewal of the supporting structures, the mean and standard deviation for all overhead conductor categories is assumed to be the same as with wood poles. ***Circuit Breaker Refurbishment - Other*** Data for age profiles of this category has been obtained through extracting all commissioned switchgear groups from SAP PM. These components are recorded in the corporate asset management system as separate assets to ensure

	they are maintained and tested correctly. Data for economic life mean and standard deviation is assumed to be the same as the "<=11kV Circuit Breaker" category under Switchgear.

Use of Estimated Information

Asset Category	Description
Poles	Data is not retained on voltage of removed poles to allow for the provision of actual economic life information by voltage. Actual data is used to prepare economic life by material type only. Missing data for some poles prevents the calculation of the age of those poles.
Overhead conductors	Data is not retained for removed conductors to allow for the provision of economic life information based on actual data therefore it is estimated to be the same as wood poles as removal of poles would normally result in the replacement of the conductors.
Underground cables	For a few categories, there is insufficient data to calculate economic life based on actual figures for the corresponding category. It has been estimated to be similar to assets in similar asset/voltage category.
Service lines	Data is not retained for removed overhead service lines to allow for the provision of economic life information based on actual data. The economic life has been estimated to be the same as the RESET RIN 2014 and is considered reasonable in the absence of actual values.
Transformers	For a few categories, there is insufficient actual data for removed assets to calculate the mean and

	standard deviations for economic life. It has been estimated to be similar to assets in similar asset/voltage category.
Switchgear	For a few categories, there is insufficient actual data for removed assets to calculate the mean and standard deviations for economic life. It has been estimated to be similar to assets in similar asset/voltage category.
Public Lighting	Data is not retained for lamps, luminaires and brackets that were replaced to allow for the provision of economic life information based on actual data. The economic life is calculated using the date difference between the streetlight pole retirement date and the commissioned date of the luminaire/lamp/bracket. The average life and standard deviation is calculated using combined major and minor roads categories.
SCADA, network control and protection systems	Some data in this category is not currently retained in any asset system. Data is not retained for communication network assets, communication linear, master station and local network wiring assets that were removed/replaced to allow for the provision of economic life information based on actual data.
Other	Data is not retained for removed overhead streetlighting to allow for the provision of economic life information based on actual data therefore it has been estimated to be the same as wood poles. Some data in Circuit Breaker Refurbishment category is not currently retained in any asset system. The economic life and standard deviation for Towers has been estimated to be the same as FY19 as

	there were no towers retired in the last 5 financial years.

Global assumptions

- No privately owned assets are included in the data sets.
- Data quantities are correct as of the time of extract. As SAP PM is a live system, subject to continuous update, process improvements, data cleansing and correction; asset counts are subject to change.
- Asset ages are as recorded in the SAP PM system, or other records as appropriate. For many older assets, these ages are derived from associated assets as records for that asset type were not kept (e.g. poles, services, conductors, SCADA). As such there are inherent inaccuracies in this data.
- UG cables for 66kV has been assumed to be similar to 33kV due to the small population of 66kV cable decommissioned which is considered reasonable for its asset voltage.
- If the population data for economic life is too small, the economic life of similar asset type or voltage is used.
- Due to the lack of source data and minimal changes for optical fibre component, the standard deviation and mean has been estimated to be similar to the previous financial data.
- Master station asset have been historically tracked in a spreadsheet format and is being cleansed as the data is transferred into the corporate asset management system.
- HV conductors with an unknown phase type split (i.e single or multiphase) has been assigned as multiphase.
- Poles that have insufficient information to have RIN categories assigned have been assumed to be <=1kV poles in their corresponding material category.

Reliability of Information

N/A

Template - 5.3 MD Network Level

Table 5.3.1 - RAW AND WEATHER CORRECTED COINCIDENT MD AT NETWORK LEVEL (Summed at transmission connection point) 1

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of this Notice.

Source of Information

The Raw demand, date, time and season are actual values calculated from Ausgrid's spatial demand forecast system, which is derived from measurements collated from Ausgrid's SCADA or metering points.

Sources of Information:

All data is sourced from Ausgrid's SCADA or metering points.

Methodology & Assumptions

Raw coincident network maximum demand MW and MVA is an aggregation of the coincident loads of all transmission connection points within the Ausgrid Network at the recorded date and time of system peak.

For forecasting purposes, Ausgrid's winter season covers period 1 May - 31 August. Therefore data provided for 2020, for example, covers the calendar period 1 May 2019 - 30 April 2020.

All load data is obtained from Ausgrid's SCADA system or metering points.

Ausgrid interprets "transmission connection point" as any "subtransmission substation" and "High Voltage Customer" connected at 132kV within Ausgrid's network.

A 5 year historical system diversity factor is calculated for all locations based on the previous five seasons' diversity factors for each location.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Table 5.3.1 - RAW AND WEATHER CORRECTED COINCIDENT MD AT NETWORK LEVEL (Summed at transmission connection point) 2

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of this Notice.

Source of Information

The 10% POE and 50% POE values are estimates of the POE demand calculated using actual raw data and simulation techniques. The embedded generation value is an estimate based on an assumed solar generation profile applied to the actual installed rooftop solar capacity for each zone substation on the Ausgrid network.

Sources of Information:

The 10% POE and 50% POE values are calculated using electricity use data sourced from Ausgrid's SCADA or metering points and weather data sourced from the Australian Bureau of Meteorology.

The embedded generation value is calculated using the raw interval data from representative gross metered solar power systems, the solar system size in kW for all solar power systems connected to the network and the time of peak.

Methodology & Assumptions

Weather corrected 10% and 50% POE network coincident demand is the aggregation of each location's respective weather corrected load with its system diversity factor for that season.

All load data is obtained from Ausgrid's SCADA system or metering points. All weather data is obtained from Bureau of Meteorology weather stations.

Ausgrid performs weather normalisation at 10% and 50% POE using simulation technique at the zone substation level on a yearly basis.

For forecasting purposes, Ausgrid's winter season covers period 1 May - 31 August. Therefore data provided for 2019, for example, covers the calendar period 1 May 2018 - 30 April 2019.

Ausgrid interprets "transmission connection point" as any "subtransmission substation" and "High Voltage Customer" connected at 132kV within Ausgrid's network.

A 5 year historical system diversity factor is calculated for all locations based on the previous five seasons' diversity factors for each location.

The Embedded generation value is the estimated MW of generation supplied from rooftop solar at the time of network coincident MD plus the actual metered generation supplied from non-solar embedded generators connected at 33kV or 66kV at the time of network coincident MD.

For rooftop solar, the embedded generation is calculated from a solar generation curve which identifies the percent of total rated capacity in kW for each half hour interval. This curve is based upon the aggregate generation from a representative sample of gross metered of solar power systems on a representative sample of peak summer demand days.

For the identified time of system demand, the total estimated MW generation at time of peak is derived from multiplying the percent of rated solar capacity value at the time of peak by the total MW of connected rooftop solar power systems from Ausgrid's customer data systems.

For the 33kV or 66kV connected non-solar generators, the adjustments are based on their interval data from SCADA systems or metering points.

Assumptions:

N/A

Use of Estimated Information

The 10% POE and 50% POE values are not measured values and so must be calculated. The estimates of the POE demand are calculated using actual raw metered data and established simulation techniques.

The embedded generation value is not measured as individual solar power systems are not separately measured at generation point.

Reliability of Information

N/A

Template - 5.4 MD Utilisation Spatial

Table 5.4.1 NON-COINCIDENT & COINCIDENT MAXIMUM DEMAND 1

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of this Notice.

Source of Information

The 10% POE and 50% POE values are estimates of the POE demand calculated using actual raw data and simulation techniques. The embedded generation values are an estimate based on an assumed solar generation profile applied to the actual installed rooftop solar capacity for each zone substation on the Ausgrid network.

Sources of Information:

The 10% POE and 50% POE values are calculated using electricity use data sourced from Ausgrid's SCADA or metering points and weather data sourced from the Australian Bureau of Meteorology.

The embedded generation value is calculated using the raw interval data from representative gross metered solar power systems, the solar system size in kW for all solar power systems connected to the network and the time of peak.

Methodology & Assumptions

Ausgrid performs weather normalisation at 10% and 50% POE using simulation technique at each zone substation on a yearly basis.

Historical Non-coincident 10% and 50% POE Maximum Demand is the weather normalised load based on the simulation output of the forecast system.

Historical Coincident 10% and 50% POE Maximum Demand is the weather normalised load based on the simulation output of the forecast system multiplied by the corresponding coincidence factor for each respective year.

All load data is obtained from Ausgrid's SCADA system or metering points. All weather data is obtained from Bureau of Meteorology weather stations.

For forecasting purposes, Ausgrid's winter season covers period 1 May - 31 August. Therefore data provided for 2020, for example, covers the calendar period 1 May 2019 - 30 April 2020.

For any substation that is not commissioned in a particular year, the cell is left blank as instructed.

Any substation that does not have any historical demand values entered are new substations under construction, and the magnitude of future transfers have not yet been determined and no transfers works have been financially committed.

The Embedded generation value is the estimated MW of generation supplied from rooftop solar at the time of substation coincident MD plus the actual metered generation supplied from non-solar embedded generators connected at 33kV or 66kV at the time of coincident MD.

For rooftop solar, the embedded generation is calculated from a solar generation curve which identifies the percent of total rated capacity for each half hour interval. This curve is based upon the aggregate generation from a representative sample of gross metered of solar power systems For the identified time of system demand, the percent on the installed rated solar capacity by substation, the date and time of system peak and the average solar generation profile as a function of rated capacity over a range of summer peak days.

For the connected non-solar generators, the adjustments are based on their interval data from SCADA systems or metering points.

STS values are the calculated using the same method, based on the total installed capacity from downstream zone substations.

Use of Estimated Information

The 10% POE and 50% POE values are not measured values and so must be calculated. The estimates of the POE demand are calculated using actual raw metered data and established simulation techniques.

The embedded generation value is not measured as individual solar power systems are not separately measured at generation point.

Reliability of Information

N/A

Table 5.4.1 NON-COINCIDENT & COINCIDENT MAXIMUM DEMAND 2

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of this Notice.

Source of Information

The substation rating, raw demand, date, time and season are actual values calculated from Ausgrid's spatial demand forecast system, which is derived from measurements collated from Ausgrid's SCADA or metering points.

Sources of Information:

All data is sourced from Ausgrid's SCADA or metering points.

Methodology & Assumptions

Substation rating (MVA), Raw MW and Raw MVA taken from Ausgrid's spatial demand forecast for each respective historical year. The higher of the summer and winter Raw MW for each year determines the dominant season with the corresponding substation rating, date and time of peak being displayed for that year.

For forecasting purposes, Ausgrid's winter season covers period 1 May - 31 August. Therefore data provided for 2020, for example, covers the calendar period 1 May 2019 - 30 April 2020.

All load data is obtained from Ausgrid's SCADA system or metering points.

For any substation that is not commissioned in a particular year, the cell is left blank.

Any substation that does not have any historical demand values entered are new substations under construction, and the magnitude of future transfers have not yet been determined and no transfers works have been financially committed.

Assumptions:

N/A

Use of Estimated Information

N/A

Reliability of Information

N/A

Template - 6.3 Sustained Interruptions

Table 6.3.1 - SUSTAINED INTERRUPTIONS TO SUPPLY

Compliance with Requirements of the Notice

The information provided is consistent with the requirements of this Notice unless specified in the methodology and assumptions.

Source of Information

The data is taken from outage event records located in Ausgrid's Outage Management System (OMS) and its related reporting environment NORD. Fields within each OMS record are entered both automatically and manually and are subject to quality assurance checks. Information for interruptions affecting single premises is sourced from Ausgrid's Customer Aided Service System (CASS). For other network events, supply restoration and other information is recorded by System Operators in the Sydney control room on Interruption Report Forms (blue forms), or by System Operators in the Newcastle control room on Line Impedance Data (LID) system reports, and on switching sheets. This information is reconciled into OMS post event. Following an outage, an Ausgrid officer validates the existing OMS record against the blue form or LID system report and customer call data. If the existing outage event record can be made to accurately reflect interruption details it is completed. Otherwise, the event is recreated in OMS based on switching details such that the record accurately reflects the restoration switching.

OMS outage event records include the following fields:

- Date of event
- Time of interruption
- Time of restoration
- Event trigger
- Number of Customers Interrupted (CI)
- Number of Customer Minutes Interrupted (CMI)
- Feeder ID
- Event Hierarchy
- Exclusion Flag

- Exclusion Reason

OMS automatically calculates CI and CMI by combining the following information:

- Electrical connectivity details from Ausgrid's Graphical Information System (GIS)
- Interruption and restoration steps as recorded by System Operators
- National Metering Identifier (NMI) information from SAP, Customer Care Solution (CCS) and Business to Business (B2B).

The automatic calculation of CI and CMI is based on NMIs and therefore excludes all unmetered supplies. CI and CMI calculations are automatic based on manually entered interruption and switching steps. SAP, CCS and B2B are used to exclude inactive and permanently disconnected customers from the calculation of CI and CMI. The reporting environment contains data extracted from OMS that has been cleansed to remove redundant data. Relevant calculations such as SAIDI, SAIFI are all calculated within the NORD reporting environment.

Methodology & Assumptions

The data is extracted from OMS reporting environment for the 2019/20 regulatory period using queries obtained from business objects. As Ausgrid event categorization is not in accordance with the AER categories a remapping has been performed within the NORD reporting environment. All data is transmitted to the Rosetta Data portal via their API.

Assumptions:

Nil

Use of Estimated Information

Reliability of Information

There was a large number of MED days during 2019/20 reporting period resulting in high levels of total unplanned events and excluded events.