Basis of Preparation

2016/17 Response to Economic Benchmarking RIN dated 18 December 2013

October 2017

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Purpose

The RIN requires Ausgrid to prepare a Basis of Preparation. By this, the AER means that for every variable in the Templates, Ausgrid must explain the basis upon which we prepared information to populate the input cells. The Basis of Preparation must be a separate document (or documents) that Ausgrid submits with its completed Templates. The AER will publish Ausgrid's Basis of Preparation along with the Templates.

AER's instructions

The AER requires the Basis of Preparation to follow a logical structure that enables auditors, assurance practitioners and the AER to clearly understand how Ausgrid has complied with the requirements of the Notice.

To do this, Ausgrid has structured its Basis of Preparation with a separate section to match each of the worksheets titled '3.1 Revenue' to '3.7 Operating environment' in the Templates.

Ausgrid has structured these sections with subheadings for each subject matter table in each worksheet. For example, for the worksheet '3.4 Operational data', Ausgrid explains its Basis of Preparation for the Variables under the heading '3.4.1 Energy delivery', '3.4.2 Customer numbers' and '3.4.3 System demand'.

Ausgrid must include in its Basis of Preparation, any other information Ausgrid prepares in accordance with the requirements of the Notice (including this document). For example, if Ausgrid chooses to disaggregate its RAB using its own approach in addition to the AER's standard approach, Ausgrid must explain this in its Basis of Preparation.

The AER has set out what must be in the Basis of Preparation. This is set out below:

	Requirements of Basis of Preparation
1	Demonstrate how the information provided is consistent with the requirements of the Notice
2	Explain the source from which Ausgrid obtained the information provided
3	Explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made
4	In circumstances where Ausgrid cannot provide input for a Variable using Actual Information, and therefore must use an estimate, explain: (i) why an estimate was required, including why it was not possible for Ausgrid to use Actual Information; (ii) the basis for the estimate, including the approach used, assumptions made and reasons why the estimate is Ausgrid's best estimate, given the information sought in the Notice.
5	For Variables that contain Financial Information (Actual or Estimated) the relevant Basis of Preparation must explain if accounting policies adopted by Ausgrid have Materially changed during any of the Regulatory Years covered by the Notice: (i) the nature of the change; and (ii) the impact of the change on the information provided in response to the Notice. Ausgrid may provide additional detail beyond the minimum requirements if Ausgrid considers it may assist a user to gain an understanding of the information presented in the Templates. In relation to providing an audit opinion, or making an attestation report on the Templates presented by Ausgrid, an auditor or assurance practitioner shall provide an opinion or attest by reference to Ausgrid's Basis of Preparation.

Structure of this document

The document is structured as follows:

- We outline our general approach to developing our response to the RIN.
- We set out our response to worksheets 3.1 to 3.7, in accordance with the AER's instructions.

General approach

In this section, we identify our general approach to collecting and preparing information.

Systems used to provide data

Where data has been sourced directly from Ausgrid's financial and other information systems this system has been identified. Similarly where estimated data is based on data sourced from Ausgrid's systems those systems are identified.

Process used to determine if information is actual or estimated

Where Actual Information is not able to be derived from Ausgrid's financial and information systems, then information has been estimated on the basis which Ausgrid considers provides the best available estimate. In circumstances where the AER has recommended an approach for estimating, that approach has been followed as far as practicable and reasons for variations have been identified and explained.

Worksheet 3.1 – Revenue

3.1.1 Revenue grouping by chargeable quantity

Compliance with requirements of the notice

The information reported in Table 3.1.1 is consistent with the requirements of the Notice, the AER's RIN Benchmarking Explanatory Statement and the AER's Instructions and Definitions Manual. In particular, the Revenue reported in Table 3.1.1:

- has been reported in accordance with the definition of Standard Control Services and Alternative Control Services as set out in the AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 13 – Classification of Services April 2015.
- has been grouped into chargeable quantity categories in accordance with the definitions provided in the RIN Economic Benchmarking Instructions and Definitions Manual, November 2013.

In accordance with the instructions provided, Total Revenue by Chargeable Quantities reported in Table 3.1.1 equals the Total Revenue by Customer Class reported in Table 3.1.2. Also Revenue from Unmetered Supplies reported in Table 3.1.1 agrees to Unmetered Supplies reported in Table 3.1.2.

The completion of Table 3.1.1 for the 2016-17 year has been prepared in a consistent manner to the completion of the 2005-06 to 2014-15 and 2015-16 Revenue Templates previously submitted to the AER.

The Revenue reported in Table 3.1.1 is in accordance with the Regulatory Accounting Statements as per the Annual Reporting Requirements and reconciles to Direct Control Services revenues reported in the Regulatory Accounting Statements (Annual reporting RIN).

On the 24 May, the full Federal Court partly upheld the AER's appeal in relation to the Australian Competition Tribunal's decision to set aside the AER's April 2015 Revenue Determination and Allowable Annual Revenue for the period July 2014 to June 2019. In the absence of an applicable 2014-2019 distribution determination, Ausgrid has entered into an enforceable undertaking in agreement with the AER under section 59A of the National Electricity (NSW) Law for 2016-17. This undertaking expired on 30 June 2017.

Ausgrid has used the AER Final Decision and the enforceable undertaking as the basis for the preparation of the information.

Source of information

Table 3.1.1 Revenue Grouping by chargeable Quantities - Variables DREV101 to DREV0113 have been sourced from SAP Financials and SAP Business Intelligence (BI) Network Tariff Reports.

Methodology and Assumptions

Revenue reported in Table 3.1.1 is as per the definition of Standard Control Services and Alternative Control Services as set out in the in the AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 13 – Classification of Services April 2015.

Standard Control Services – are those services central to the supply of electricity and are relied on by the majority of our customers which is essentially the delivery of electricity. The cost of providing these services is recovered through DUoS tariffs paid by all or most of our customers. As Ausgrid operates both distribution and dual function assets, the revenue requirements for standard control services is split between Distribution Standard Control Services and Transmission Standard Control Services.

Alternative Control Services – are services that are customer specific or customer requested services. Alternative control services include public lighting, type 5-6 metering services and ancillary network services. In line with the AER Final Decision there are two types of charges for the provision of Type 5 & 6 metering services for the 2015-19 Regulatory control period. The charges are an upfront capital charge and an annual metering service charge (MSC).

For Type 5 & 6 metering services, effective from 1 July 2015 the annual metering service charge was unbundled from the Distribution Standard Control Services. In addition, the upfront capital charge was applied to all new and upgraded meters installed from 1 July 2015.

It should also be noted that as set out in Stage 1 Framework and Approach paper, Ausgrid, Endeavour Energy and Essential Energy – the transitional regulatory control period 1 July 2014 to 30 June 2015 and subsequent regulatory control period 1 July 2015 to 30 June 2019, March 2013, the AER has reclassified some of Ausgrid's services from standard control to alternative control.

Total Revenue reported in Table 3.1.1 for the financial year 2016-17 includes both billed and accrued data.

BI Network Tariff report collates billed and accrued revenue by Network Tariff and Tariff component. This has been used to enable the completion of Table 3.1.1 Variables DREV0101 to DREV0109.

The Variables DREV0101 to DREV0109 categorises Distribution Use of System Revenue into tariff component charges.

Each Ausgrid Network DUoS tariff is comprised of more than one component except for unmetered loads which has only a single component.

DREV0101	This represents the Network Access Charge (NAC) of the Ausgrid Network Tariff. This is a fixed (c/day) applied to each energised connection point at which energy or demand is recorded.
DREV0102	This represents Non Time of Use charge (c/kWh) applied to the total energy determined from an energy only meter. Step pricing structures applies to selected Non Time of Use energy charges.
DREV0103	Revenue from customer consumption of electricity during peak period.
DREV0104	Revenue from customer consumption of electricity during shoulder period
DREV0105	Revenue from customer consumption of electricity during off peak period
DREV0106	Controlled Load is applicable to electricity which is separately metered and controlled. It is used for operating storage water heaters, thermal storage space heaters, and other approved fixed wired appliances. Control Load Tariffs are secondary tariffs and can only be applied at installations with selected Primary Tariffs.
DREV0107	Unmetered Supplies are metering installations that do not have a physical meter attached to the installation.
DREV0108	For the financial period 2016-17 Contracted Maximum Demand Charges was not a component of the Ausgrid Network Tariff
DREV0109	This variant includes charges calculated on maximum demand that is either reset on a monthly basis or ratcheted.

Variables DRE0110 to DREV0113 categorises the remaining Standard Control Revenues and Alternative Control Revenues.

Standard Control

DREV0113	Ausgrid Prescribed Transmission Standard Control Services Revenue NER Chapter Part N 6.24.2 - any service provided by a DNSP by means of the DNSP's dual function assets that, but for this Part, would be prescribed transmission service for the purposes of Chapter 6A is deemed to be a standard control service.

Alternative Control Revenue

DREV0110	In line with Stage 1 Framework & Approach paper and Transitional Distribution decision, Ancillary Network Services and Type 5 & 6 metering services have been reclassified as Alternative Control. Those services reported as metering related services have been identified in line with Attachment 8.08 Revisions to the Ancillary Network Services Proposal Appendix 1.
DREV0111	In line with Stage 1 Framework & Approach paper and Transitional Distribution decision, - Ancillary Network Services and Type 5 & 6 metering services have been reclassified as Alternative Control. Those services reported as connection related services have been identified in line with Attachment 8.08 Revisions to the Ancillary Network Services Proposal Appendix 1.
DREV0112	The construction and maintenance of Public Lighting Infrastructure Customer specific services

Use of estimated information

There is no estimated information for Revenue groupings by chargeable Quantities

Material accounting policy changes

There has been no material accounting changes during the financial period 2016-17 that has had an impact on Revenue reported in Table 3.1.1.

3.1.2 Revenue grouping by customer type of class

Compliance with requirements of the notice

The information reported in Table 3.1.2 is consistent with the requirements of the Notice, the AER's RIN Benchmarking Explanatory Statement and the AER's Instructions and Definitions Manual. In particular, the Revenue reported in Table 3.1.2;

- has been reported in accordance with the definition of Standard Control Services and Alternative Control Services as set out in the AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 13 – Classification of Services April 2015.
- has been grouped into chargeable quantity categories in accordance with the definitions provided in the RIN Economic Benchmarking Instructions and Definitions Manual, November 2013.

In accordance with the instructions provided Total Revenue by Chargeable Quantities reported in Table 3.1.1 equals the Total Revenue by Customer Class reported in Table 3.1.2. Also Revenue from Unmetered Supplies reported in Table 3.1.1 agrees to Unmetered Supplies reported in Table 3.1.2.

The completion of Table 3.1.2 for the 2016-17 year has been prepared in a consistent manner to the completion of the 2005-06 to 2014-15 and 2015-16 Revenue Templates previously submitted to the AER.

On the 24 May, the full Federal Court partly upheld AER's appeal in relation to the Australian Competition Tribunal's decision to set aside the AER's April 2015 Revenue Determination and Allowable Annual Revenue for the period July 2014 to June 2019. In the absence of an applicable 2014-2019 distribution determination, Ausgrid has entered into an enforceable undertaking in agreement with the AER under section 59A of the National Electricity (NSW) Law for 2016-17. This undertaking expired on 30 June 2017.

Ausgrid has used the AER Final Decision and the enforceable undertaking as the basis for the preparation of the information.

Source of information

Table 3.1.2 Revenue groupings by customer type or class - Variables DREV0201 to DREV0206 have been sourced from SAP Financials and SAP Business Intelligence (BI) Network Tariff Reports.

Methodology and Assumptions

Revenue reported in Table 3.1.2 is as per the definition of Standard Control Services and Alternative Control Services as set out in the in the AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 13 – Classification of Services April 2015.

Standard Control Services – are those services central to the supply of electricity and are relied on by the majority of our customers which is essentially the delivery of electricity. The cost of providing these services is recovered through DUoS tariffs paid by all or most of our customers. As Ausgrid operates both distribution and dual function assets, the revenue requirements for standard control services is split between Distribution Standard Control Services and Transmission Standard Control Services.

Alternative Control Services – are services that are customer specific or customer requested services. Alternative control services include public lighting, type 5-6 metering services and ancillary network services. In line with the AER Final Decision there are two types of charges for the provision of Type 5 & 6 metering services for the 2015-19 Regulatory control period. The charges are an upfront capital charge and an annual metering service charge (MSC).

For Type 5 & 6 metering services, effective from 1 July 2015 the annual metering service charge was unbundled from the Distribution Standard Control Services. In addition, the upfront capital charge was applied to all new and upgraded meters installed from 1 July 2015.

It should also be noted that as set out in Stage 1 Framework and approach paper, Ausgrid, Endeavour Energy and Essential Energy – the transitional regulatory control period 1 July 2014 to 30 June 2015 and subsequent regulatory control period 1 July 2015 to 30 June 2019, March 2013, the AER has reclassified some of Ausgrid's services from standard control to alternative control.

Total Revenue reported in Table 3.1.2 for the financial year 2016-17 includes both billed and accrued data.

BI Network Tariff report collates billed and accrued revenue by Network Tariff and Tariff component. This has been used to enable to completion of Table 3.1.2 Variables DREV0201 to DREV0205.

The Variables DREV0201 to DREV0205 categorises Distribution Use of System by Customer class

Each Ausgrid Network DUoS tariff is comprised of more than one component except for unmetered loads which has only a single component.

DREV0201	Residential Tariffs are assigned to premises where electricity use is principally for private domestic purposes. For Ausgrid this includes (but is not limited to) Residential Tariffs such as EA010 Residential Inclining Block, EA025 Residential ToU and Controlled Loads 1 & 2.
DREV0202	Revenue from Non Residential Customers not on demand includes (but is not limited to) Small Business Tariffs such as EA050 Small Business Inclining Block and EA225 Small Business ToU.
DREV0203	Revenue from Non Residential Low Voltage Demand Tariff Customers is assigned to those customers where the usage is from 40MWh up to 750MWh per annum. This includes (but is not limited to) the following Tariffs EA302 LV 40-160MWh Tariff, EA305 LV 160-750MWh Tariff and EA310 >750MWh.
DREV0204	Revenue from Non Residential High Voltage Demand Tariff Customers includes EA370 and EA380 HV Connection Network Tariffs, EA390 Sub-transmission Connection Network Tariff and CRNP Tariffs.

DREV0205	Unmetered Supplies are metering installations that do not have a physical meter attached to the installation. These include Network Tariffs EA401 Public Lighting, EA402 Constant Unmetered and EA403 EnergyLight.

Variables DRE0206 categorises other Standard Control Revenue and Alternative Control Revenue

Standard Control

DREV0206	Ausgrid Prescribed Transmission Standard Control Services Revenue NER Chapter Part N 6.24.2 - any service provided by a DNSP by means of the DNSP's dual function assets that, but for this Part, would be prescribed transmission service for the purposes of Chapter 6A is deemed to be a standard control service.

Alternative Control Revenue

DREV0206	Type 5 & 6 metering services Ancillary Network Services – metering and connection service fees The construction and maintenance of Public Lighting Infrastructure Customer specific services

Use of estimated information

There is no estimated information for Revenue groupings by Customer Type or Class

Material accounting policy changes

There has been no material accounting changes during the financial period 2016-17 that has had an impact on Revenue reported in Table 3.1.2.

3.1.3 Revenue (penalties) allowed (deducted) through incentive schemes

Compliance with requirements of the notice

The information reported in Table 3.1.3 is consistent with the requirements of the Notice, the AER's RIN Benchmarking Explanatory Statement and the AER's Instructions and Definitions Manual, November 2013.

The completion of Table 3.1.3 for the 2016-17 year has been prepared in a consistent manner to the completion of the 2005-06 to 2014-15 and 2015-16 Revenue Templates previously submitted to the AER.

On the 24 May, the full Federal Court partly upheld AER's appeal in relation to the Australian Competition Tribunal's decision to set aside the AER's April 2015 Revenue Determination and Allowable Annual Revenue for the period July 2014 to June 2019. In the absence of an applicable 2014-2019 distribution determination, Ausgrid has entered into an enforceable undertaking in agreement with the AER under section 59A of the National Electricity (NSW) Law for 2016-17. This undertaking expired on 30 June 2017.

Ausgrid has used the AER Final Decision and the enforceable undertaking as the basis for the preparation of information.

Source of information

AER Placeholder determination for the transitional regulatory control period 2014-15, April 2014

AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 12 - Demand management incentive schemes April 2015

AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 11 – Service target performance incentive scheme April 2015

AER Final Decision - Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 1 – Annual revenue requirement April 2015

AER, Stage 1 Framework and Approach paper, Ausgrid, Endeavour Energy and Essential Energy - Transitional Regulatory Control Period 1 July 2014 to 30 June 2015 and Subsequent Regulatory Control Period 1 July 2015 to 30 June 2019, March 2013

AER, Stage 2 Framework and Approach paper, Ausgrid, Endeavour Energy and Essential Energy - Transitional Regulatory Control Period 1 July 2014 to 30 June 2015 and Subsequent Regulatory Control Period 1 July 2015 to 30 June 2019, January 2014

Methodology and Assumptions

Revenue reported in Table 3.1.3 has been populated as follows:

Variant DREV0301 - *Efficiency Benefit Sharing Scheme (EBSS).* The reward resulting from the application of the EBSS was $62.7 million (nominal) for 2016-17. The approved amount of $59.5 million, as documented in the AER Final Ausgrid Determination 'Attachment 9 – Efficiency Benefit Sharing Scheme' report, was converted to nominal dollars by applying a factor derived from the relevant CPI rates for each year (as listed in the table below) to the distribution and transmission components of the EBSS amount. EBSS is calculated in accordance with 'Attachment 14 - Control mechanisms' (section 14.5.3) from the AER's final decision.

Actual CPI		FY15	FY16	FY17
Distribution		2.49%	1.51%	1.28%
Transmission		1.72%	1.69%	1.48%

Variant DREV0302 - *Service Target Performance Incentive Scheme (STPIS).* In the regulatory control period 2016-17 for NSW/ACT DNSPs no STPIS applies.

Variant DREV0303 – F-Factor does not apply to NSW for 2016-17.

Variant DREV0304 – S-Factor True up does not apply to NSW for 2016-17.

Variant DREV0305 – The amount of $1.05 million (nominal) relates to DMIA, which is allowed by the AER for 2016-17 as per its final decision for the 2015-19 regulatory period. The approved annual DMIA amount of $1 million was converted to nominal dollars by applying a factor derived from relevant CPI rates for each year as listed in the below table. DMIA is calculated in accordance with Attachment 14 - Control Mechanisms' (section 14.5.3) from the AER's final decision.

Actual CPI		FY15	FY16	FY17
Distribution		2.49%	1.51%	1.28%

It should be noted that Ausgrid has deferred submitting an application for recovering expenditure made under the DMIA until the AER has made its determination for the current regulatory period. The DMIA adjustment amount calculated in relation to the 2009-2014 regulatory period totalled (-$2.56m). Recoupment of this amount will form part of the true-up required as part of this process. The D-factor amount for 2016-17 is zero. As noted previously, the AER has decided not to continue with the D-factor for the 2015-19 period and that any remaining expenditure from the application of this scheme in the 2009-14 period has been recovered in the 2015-16 revenue (via the annual pricing proposal and as part of the control mechanism).

Use of estimated information

Under the AER final decision, both the DMIA & EBSS are included in the Distribution and Transmission annual revenue requirements for the period 2015-19. As a result, the DMIA allowance and EBSS are recovered as part of the actual DUOS and TUOS prices and cannot be unbundled from the actual revenue to allow for the reporting of 'actual' revenue from incentive schemes. Consequently, we have reported the amount allowed by the AER in its final decisions for incentive schemes in this template.

For these reasons the amount provided is considered to be the best estimate of the information required by the RIN.

The basis for completing Table 3.1.3 is reliant on sources outlined above under Sources of information.

Material accounting policy changes

There has been no material accounting changes during the financial period 2016-17 that has had an impact on Revenue reported in Table 3.1.3.

Worksheet 3.2 – Opex

3.2.1 Opex categories

Compliance with requirements of the notice

Information reported in Table 3.2.1 is in accordance with the audited statutory financial statements, the requirements of the Notice, AER's RIN Economic Benchmarking Explanatory Statement and Instructions and Definitions Manual November 2013, the Regulatory Accounting Statements (Annual Reporting RIN), and Ausgrid's Cost Allocation Methodology (CAM). Table 3.2.1 has been reported following the accounting principles and policies specified in the Annual Reporting RIN requirements. Ausgrid's statutory financial statements comply with Australian Accounting Standards. Ausgrid has reported operating expenditure line items in a manner that is consistent with the 2014-19 Ausgrid Regulatory Proposal.

Ausgrid allocates costs to each business service on either a direct attribution basis or by the application of allocators. A comprehensive review of the allocations between Standard Control Services (SCS), Alternative Control Services (ACS), and Unregulated Services occurs each year. Compliance is in line with the CAM. The current CAM is on Ausgrid's Website.

Operating expenditure reconciles to the 2016/17 Annual Reporting RIN.

Source of information

Actual data for 2016/17 has been based on an extraction of actual financial data directly or via TM1 from our SAP financial system (Ausgrid's financial accounting and reporting system). The TM1 system is used to report the line of business view of the financial information. Ausgrid also has in place finance policies and Statement of Accounting Treatments (SATs), company policies and procedures, a centralised finance function and qualified employees who are able to manage the requirements.

On 20 October 2016 the Premier and Treasurer of New South Wales entered into a binding agreement with an Australian owned consortium comprising of IFM Investors and Australian Super for the 99 year lease of 50.4 per cent of Ausgrid. The completion date was 1 December 2016. The State retains 49.6 per cent interest in the lease.

The financial data provided in this submission is a full year view. It consists of 5 months consolidated data to 30 November 2016 under the operating structure of a State Owned Corporation and 7 months consolidated data from 1 December 2016 to 30 June 2017 under the new Ausgrid Operating structure. This new consolidation structure consists of two partnerships, Ausgrid Operator Partnership ('AOP') and Ausgrid Asset Partnership ('AAP') plus their respective controlled entities, Ausgrid Management Pty Limited and Ausgrid Finance Pty Limited. Intercompany transactions have been eliminated.

Methodology and Assumptions

Operating expenditure reported in Table 3.2.1 has been prepared in accordance with the definition of Standard Control Services and Alternative Control Services as set out in the AER Final Decision – Ausgrid Distribution Determination 2015-16 to 2018-19, April 2015; Attachment 13 – Classification of Services, April 2015, and Ausgrid's CAM and aligns to the operating expenditure categories used in the 2014-19 Ausgrid Regulatory Proposal.

The operating expenditure categories are consistent between the SCS, ACS and Unregulated Services and agree to 2014-19 Ausgrid Regulatory Proposal. The financial numbers align to the financial data extracted from SAP and TM1 (Ausgrid's financial accounting and reporting systems).

Costs relating to operating expenditure categories listed above have been extracted from SAP via the TM1 cube for FY 2016/17 according to profit centre mapping for each operating expenditure category for standard control and alternative control services.

Profit centres are grouped into different divisions that reflect Ausgrid's organisational structure and are used for reporting purposes only. Costs incurred for operations work are directly attributed to, or allocated between, standard control services, alternative control services and/or unregulated services respectively. This is based on the nature of the expenditure and in accordance with the CAM. Costs are allocated between categories of service according to cost objects in SAP. Cost objects are the lowest at which transactions are aggregated in SAP. Cost objects aggregate to form a profit centre which identifies the division in Ausgrid.

Ausgrid recognised any year end adjustments in the category titled “Finance Function”. The SCS and ACS for this category for 2016/17 reflect the decrease in the actuarial assessed provisions. This has resulted in a negative impact to this category. The Management operating expenditure category has increased in 2016/17 reflecting the payment of redundancies.

Use of estimated information

Actual information has been obtained.

Material accounting policy changes

There have not been any material changes in accounting policies.

3.2.2 Opex consistency

Compliance with requirements of the notice

Information reported in Table 3.2.2 is in accordance with the Ausgrid’s Cost Allocation Methodology and the requirements of the Notice, AER’s RIN Economic Benchmarking Explanatory Statement and Instructions and Definitions Manual, November 2013.

Operating expenditure reconciles to the 2016/17 Annual Reporting RIN.

Source of information

Financial data included in Table 3.2.2 is sourced from SAP and TM1 (Ausgrid’s financial accounting and reporting systems).

Methodology and Assumptions

Operating expenditure reported in Table 3.2.2 has been prepared in accordance with Ausgrid’s Cost Allocation Methodology. Financial data included in Template 3.2.2. is sourced from SAP and TM1.

Ausgrid has determined standard control services “operating expenditure for network services” as the aggregate of operating expenditure for the year less the operating expenditure for metering.

Ausgrid has aligned the Alternative Control Services operating expenditure for metering, connection services, public lighting and network services to the Category Analysis RIN, Annual Regulatory Reporting RIN and cost objects in TM1.

There are no numbers for “Operating expenditure for amounts payable for easement levy or similar direct charges on DNSP” as Ausgrid capitalises these amounts.

There are no numbers for “Operating expenditure for transmission connection point planning” as Ausgrid’s costs are capitalised as a part of the planning of our transmission network with discussions with Transgrid.

Use of estimated information

All financial data reported in Table 3.2.2 is actual and can be verified in SAP and TM1.

Material accounting policy changes

There have not been any material changes in accounting policies.

3.2.3 Provisions

Compliance with requirements of the notice

Information reported in Table 3.2.3 is in accordance with the audited statutory financial statements, the requirements of the Notice, AER’s RIN Economic Benchmarking Explanatory Statement and Instructions and Definitions Manual November 2013, the Regulatory Accounting Statements (Annual Reporting RIN), and Ausgrid’s Cost Allocation Methodology (CAM). Table 3.2.3 has been reported following the accounting principles and policies specified in the Annual Reporting RIN requirements. Ausgrid’s statutory financial statements comply with Australian Accounting Standards.

Ausgrid allocates costs to each business service on either a direct attribution basis or by the application of allocators. A comprehensive review of the allocations between Standard Control Services, Alternative Control Services, and Unregulated services occurs each year. Compliance is in line with the CAM. The current CAM is on Ausgrid's Website.

The financial information in the template represents Standard Control Services (Distribution) and Standard Control Services (Transmission) only as per advice received from Scott Haig from the AER on 27 August 2014.

The financial information provided is for each grouping of provisions identified as follows:

- Employee Benefits
- Restructuring costs
- Insurance
- Dividends
- Other

Other provisions consist of asbestos remediation, polychlorinated biphenyls (PCB) disposal costs for end of life equipment provision, legal provision, make good provision and asset decommissioning. Each individual provision has been specified by name and the variable codes for the line items have been separately identified as required.

Source of information

Information provided is based on:

- Audited Statutory Accounting statements;
- TM1 and SAP (Ausgrid's financial accounting and reporting systems) and
- External actuarial reports.

Methodology and Assumptions

Ausgrid applied the Cost Allocation Methodology in providing the required information for 2016/17.

On 20 October 2016 the Premier and Treasurer of New South Wales entered into a binding agreement with an Australian owned consortium comprising of IFM Investors and Australian Super for the 99 year lease of 50.4 per cent of Ausgrid. The completion date was 1 December 2016. The State retains 49.6 per cent interest in the lease.

The financial data provided in this submission is a full year view. It consists of 5 months consolidated data to 30 November 2016 under the operating structure of a State Owned Corporation and 7 months consolidated data from 1 December 2016 to 30 June 2017 under the new Ausgrid Operating structure. This new consolidation structure consists of two partnerships, Ausgrid Operator Partnership ('AOP') and Ausgrid Asset Partnership ('AAP') plus their respective controlled entities, Ausgrid Management Pty Limited and Ausgrid Finance Pty Limited. Intercompany transactions have been eliminated.

Adjustments to the provision components have been made in order to disclose the discount rate. These adjustments have impacted the provision values reported in the Regulatory Accounting Statements for each Regulatory Year in the component categories of "increases to the provision" or "unused amount reversed during the period".

The discount rate assumptions applied to the provisions are outlined below:

- <u>Defined Benefits Superannuation (included in the Employee Benefits Provisions)</u>

  The defined benefits superannuation position has been assessed by the actuary. The impact and value of this assessment is recognised by Ausgrid.

- <u>Long Service Leave, Supplementary Superannuation and Severance allowance, and Preserved Sick leave (included in the Employee Benefits Provisions)</u>

  The position of these provisions has been assessed by an actuary. The impact and value of this assessment is recognised by Ausgrid.

- <u>Workers' Compensation (included in the Insurance Provisions)</u>

The position of this provision has been assessed by an actuary. The impact and value of this assessment is recognised by Ausgrid.

- PCB and Site Remediation provisions (included in the Other Provisions)

  For the regulated distribution business, the Other Provision is related to site remediation, removal and disposal of equipment and decommissioning of assets to meet the legal and constructive obligation of Ausgrid. The discount rate applied to the above provisions was based on Corporate bond rate as at 30 June.

Ausgrid has populated the opex and other categories in the employee benefits provision movements. Relevant employee costs including employee benefits are capitalised into projects when employees work on capital projects by crediting the profit & loss account and debiting the impacted projects.

In determining the allocation for the Employee Remuneration Entitlement (ERE) provisions and Insurance provision, Ausgrid has applied the latest allocation.

Use of estimated information

Actual information has been obtained.

Material accounting policy changes

No accounting policy changes for 2016/17 have had a material impact on provisions.

3.2.4 Opex for high voltage customers

Compliance with requirements of the notice
The information reported in Table 3.2.4 is consistent with the requirements of the Notice, AER's RIN Economic Benchmarking Explanatory Statement and Instructions and Definitions Manual, November 2013.

Source of information

High Voltage customer numbers and loads are sourced from Ausgrid's Metering Systems being Meter Data Agency Databased (MDA) and Maintenance Costs are sourced from SAP ECC.

Methodology and Assumptions
The process adopted was as follows;

1. Identify HV Customers and their current loads. HV Customers and their loads were identified from our metering systems.
2. Allocate HV customers' to substation types on the basis of capacity characteristics of substation types. HV loads were then allocated to various substation types on the basis of the following substation capacities;

Substation Type	Substation Capacity
Small Distribution Substations (Kiosks)	< 2MVA
Large Distribution Substations (Chambers)	2-5 MVA
Large Substations (Zones)	≥ 15 MVA

3. Estimate Ausgrid's average maintenance cost by substation type. Ausgrid's average maintenance costs by substation type were calculated by dividing total maintenance costs for the year by the number of commissioned substations. Maintenance costs are assumed to be correlated with the capital cost of the substation type i.e. maintenance costs for large substations are approximately 30 times that for a small distribution substation.
4. Derive estimated maintenance costs Maintenance costs were then estimated by multiplying the average internal maintenance costs by the number of HV substations.

Use of estimated information
Ausgrid has used estimated information for Table 3.2.4 Opex for High Voltage Customers.

Since this is a cost is incurred by customers, Ausgrid has no actual information on these costs. As a result, it is necessary to estimate this cost on the basis of available information. This is the best estimate available as the methodology used is based on information relevant and available.

These estimates are significantly limited in their application. Ausgrid has not been able to evaluate the age, condition or state of these assets. Ausgrid's actual maintenance costs, if Ausgrid owned these assets, may significantly vary from these estimates.

Material accounting policy changes

There have not been any material changes in accounting policies.

Worksheet 3.3 – Assets (RAB)

3.3.1 RAB values

Compliance with requirements of the notice

Worksheet 3.3 Asset (RAB) (hereafter RAB worksheet) required the allocation of the Regulatory Asset Base (RAB) data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided in all three templates: the Worksheet 3.3 Actual Information template, Worksheet 3.3 Estimated Information template, and the Worksheet 3.3 Consolidated Information template. These worksheets show the various asset categories for which Ausgrid must provide the relevant RAB values. These asset categories are referred to in this section as 'RIN asset categories'.

Additionally, compliance with the RIN also involved the requirements detailed in Table 1, which also details the actions Ausgrid completed to meet these requirements.

Table 1 Compliance with the RIN

Compliance Requirement	Ausgrid's Compliance
All cells filled where highlighted yellow in the templates	Ausgrid has provided information in all yellow highlighted cells.
RAB values reported in accordance to the Standard Approach (section 4.1.1) detailed in the Instructions provided by the AER.	Ausgrid has complied with the Standard Approach provided in Chapter 4 of the Instructions. Assets have been directly attributed to the RIN asset categories where appropriate, and have applied the more detailed allocation approach where direct attribution was not possible. Details are provided in following sections of this Basis of Preparation document.
RAB Standard Control Services (SCS) values reported in accordance with the Financial Reporting Framework in Box 7 of section 4.1 of the Instructions provided by the AER.	Where possible, Ausgrid provided RAB SCS in the templates making the opening balance for 2016/17 consistent with the closing balance of the 2015/16 economic benchmarking RIN (EBRIN). However, while updating the templates Ausgrid became aware of an error in the 2014/15 submission resulting in an incorrect opening RAB balance, which has been rectified in this template (further information is provided in the relevant section below). The opening balance is then updated for actual capital expenditure, disposals and CPI to arrive at the closing balance. We note that the AER is due to make a new decision on Ausgrid's revenue allowance based on the Federal Court decision. However, as this new decision is not yet available, we have continued to apply the same methodology that the AER has used in its final decision published in April 2015 to calculate a WACC that is used for the underlying RFMs in this version of the EBRIN. In the sections below, we explain and provide further details on the calculation of the 2016/17 RAB values, calculated using the AER's RFMs.

The provision of a Basis of Preparation to accompany the filled worksheets (this document); in particular detailing the allocation methodology used (see 'Methodology and Assumptions' below).	Ausgrid has complied with this requirement through the provision of this Basis of Preparation document.
Substation land to be included in the 'substation asset' category	Ausgrid has complied with this requirement by allocating all substation land to the 'substation asset' category.
Reporting of Alternative Control Services (ACS) where the AER has approved a RAB or RAB equivalent for the services, or alternatively the reporting of '0' in the absence of any approved RAB.	Ausgrid has complied with this requirement with the provision of Public Lighting RAB information as well as Type 5-6 Metering Services which the AER has classified as ACS from 1 July 2014.
All financial information are reported in thousands of dollars, rounded to the nearest dollar, and Non-Financial Information reported to 3 significant figures	Ausgrid has complied with this requirement. Please see each RAB Template.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below. Moreover, as detailed in the instructions, Table 3.3.1 must reconcile to Table 3.3.2. This requirement has been met for actual, estimated and consolidated information. The total in table 3.3.1 equates to the sum of the RIN asset categories in table 3.3.2.

Source of information

In preparation of Ausgrid's 2016/17 EBRIN, the following sources have been used.

2015/16 EBRIN

The closing balances for 2015/16 in the 2015/16 EBRIN were used as the opening balances for Type 5-6 Metering and Public Lighting ACS. The 2015/16 EBRIN could not be used to provide the opening balance for SCS (Distribution and Transmission) due to an error found in the 2014/15 Transmission RFM that was used to populate capital expenditure. Specifically, an incorrect CPI percentage was applied in that model.

Roll forward models (RFMs)

The SCS opening balance for 2016/17 was taken from the RFMs amended to correct the CPI error in 2014/15. The closing RAB values for 2016/17 have been calculated using the AER's proposed amended RFM for DNSPs issued on 31 August 2016, and based on the provisions of Schedule 6.2 of the National Electricity Rules. We note that the AER issued an updated version of the RFM on 15 December 2016, however changes between the two versions do not affect the calculations relevant to this exercise. This version of the RFM will be referred to as the "amended RFM" for the rest of this document. The inputs into the amended RFMs are reconcilable to either the AER's final decision for the 2015-19 period (issued by the AER in April 2015), or to the information provided for the purpose of preparing for this RIN (i.e. capex, disposal and capital contribution information).

Three new RFMs have been developed for the purpose of preparing for the 2016/17 EBRIN, all of which are based on the amended RFM:

1. Ausgrid Distribution RFM for the 2014-19 period: this includes distribution RAB data between 2013/14 and 2016/17. This will be referred to as the 'Distribution RFM 1419'.
2. Ausgrid Transmission RFM for the 2014-19 period: this includes transmission RAB data between 2013/14 and 2016/17. This will be referred to as the 'Transmission RFM 1419'.
3. Ausgrid Type 5 & 6 Metering RFM for the 2015-19 period: this includes type 5 and 6 metering RAB data between 2014/15 and 2016/17. This will be referred to as the 'Metering RFM 1519'.

Public lighting model

For Public Lighting ACS, the closing RAB value for 2016/17 was established using an approach consistent with the RFM, noting that there is no new capex for Public Lighting ACS as this is captured via a different control mechanism. This will be referred to as the 'Public Lighting model'.

AER's Final Decision for 2015-19

As mentioned above, Ausgrid has used forecast depreciation approved by the AER in its final decision for on the post-tax revenue model (PTRMs) for Ausgrid's SCS assets for 2015-19.

Ausgrid has also used inputs (e.g. WACC, forecast CPI, standard asset lives, remaining asset lives) from the PTRMs for 2015-19 for SCS and ACS.

We note that this final decision made by the AER in April 2015 has now been set aside due to the Federal Court ruling and the AER is due to make a new decision on Ausgrid's revenue allowance. However, as this new decision is not yet available, we have continued to apply the same methodology that the AER has used in its final decision published in April 2015 to calculate a WACC that is used for this version of the EBRIN.

Ausgrid's actual capex, disposals and capital contributions for 2016/17

In order to derive Ausgrid's net actual capex for 2016/17, which is the capex incurred by Ausgrid less the proceeds from sale of assets and capex that was funded by capital contribution, Ausgrid has disaggregated the 'actual net capex' amounts in the RFMs into actual additions (i.e. gross capex minus capital contributions) and disposals and reported these in Tables 3.3.1 and 3.3.2.

Methodology and Assumptions

The methodology for this section involved the following:

A. Standard Control Services (SCS)

The line items 'Inflation addition', 'Actual additions' (recognised in RAB) and 'Disposals' were sourced or calculated from the Distribution RFM 1419 and Transmission RFM 1419. The 'Opening Value' was set equal to the closing value of the 2015-16 EBRIN. The values shown in these line items represent the total values of all asset classes used in the provision of SCS (as they are classified for the 2014-19 period).

B. Network Services (NS)

In prior years, Network Services was obtained by removing the Metering Service RAB components from each SCS asset categories. As Metering Services are now classified by the AER as ACS from 1 July 2014, this removal is no longer necessary. Metering Services RAB is now reported as part of ACS.

C. Alternative Control Services (ACS)

Alternative Control Services Table 3.3.1 has been generated using information from the public lighting model and the Metering RFM 1519.

Net actual capex

We note that the AER's RFM recognised net actual capex which is the capex incurred by Ausgrid less the proceeds from sale of assets and capex that was funded by a capital contribution. In order to comply with the EBRIN requirements to show the actual additions and disposals separately, Ausgrid has disaggregated the 'actual net capex' amounts in the RFMs into actual additions (i.e. gross capex minus capital contributions) and disposals and reported these in Tables 3.3.1 and 3.3.2. We have adopted this approach to ensure compliance with the requirements of the RIN as well as ensuring that the closing values (which are protected cells) are calculated correctly. Also in accordance with the RFM, a half year WACC application is applied to the net actual capex.

Opening RAB balance

Ausgrid has carried forward the closing balances of the RAB from 2015/16 to be the opening balances for 2016/17 for Type 5-6 Metering and Public Lighting ACS. The 2015/16 EBRIN could not be used to provide the opening balance for SCS (Distribution and Transmission) due to an error found in the 2014/15 Transmission RFM that was used to populate capital expenditure. The SCS opening balance for 2016/17 was taken from the corrected RFMs.

Depreciation

The amended RFM allows for the option of using actual straight-line depreciation (based on actual capex) or forecast straight-line depreciation (consistent with the forecast straight-line depreciation from the PTRM). For the purpose of establishing the closing RAB for 2016/17, we have taken into account forecast depreciation (i.e. forecast straight line depreciation in the PTRM from the AER's final decision) for SCS metering assets. This is consistent with the AER's Final Decision for Ausgrid in April 2015[1], where the AER has decided to use the forecast depreciation to establish the RAB at the commencement of the 2019-24 regulatory control period.

[1] We note that this decision is to be remade by the AER on the order of the Australian Competition Tribunal; however, this aspect is not expected to change.

The RFM used to inform the 2015/16 EBRIN with respect to metering RAB erroneously used the actual depreciation method rather than the forecast method for metering assets, causing a difference of $1.1m (0.45% of the closing asset base, and we consider this to be immaterial). The AER's April 2015 decision stated that forecast depreciation is to be used for calculating the opening RAB as at 2019[2]. This has been rectified for the 2016/17 EBRIN however it will result in a discrepancy between the EBRIN data and the metering RFM used for the next regulatory submission.

Use of estimated information

In years prior to 2014/15, the Network Services lines in Table 3.3.1 had been classified as estimated information as a result of the allocation methodology used to extract metering related assets from the SCS. Now that the opening RAB value as at 1 July 2014 has been determined by the AER and the allocation approach is no longer necessary to derive the Metering RAB value, instead a separate RFM is now used for metering services and all information is classified as 'actual' from 2014/15 onwards. This is because the RAB values for SCS and ACS are derived from RFMs.

Material accounting policy changes

Not applicable.

3.3.2 Asset value roll forward

Compliance with requirements of the notice

In this section we demonstrate how the information provided is consistent with the requirements of this Notice.

The RAB worksheet required Regulatory Asset Base data to be allocated into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between Network Services, Standard Control Services and Alternative Control Services as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided in all three templates: the Worksheet 3.3 Actual Information template, Worksheet 3.3 Estimated Information template, and the Worksheet 3.3 Consolidated Information template. These worksheets show the various asset categories for which Ausgrid must provide the relevant RAB values. These asset categories are referred to in this section as 'RIN asset categories'.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1, as well as requirements specific to RIN table 3.3.2. These are detailed in Table 2 below which also specifies the actions Ausgrid completed to meet these requirements.

Table 2: Compliance with the RIN for RIN table 3.3.2

Compliance Requirement	Ausgrid's Compliance
Ausgrid must report RAB Asset Financial Information broken down in accordance with the RAB Assets as per definitions of the categories specified in Chapter 9.	Ausgrid has used the definitions specified in Chapter 9 as required. All assumptions and variations from these definitions are detailed in 'Methodology and Assumptions' below.
Where previously reported, Ausgrid must provide values separately for Easements. Otherwise, this should be included in the remaining categories. Data that includes Easements should be identified.	Easements have been reported separately. Data that contains easements has been identified.
Provision of Actual information where applicable	Ausgrid has attempted to provide as much actual information as possible. In some cases the RFM requires forecast information (e.g. forecast CPIs) and these are sourced from the AER's final approved RFMs or PTRMs. Actual capex and proceeds from sale of assets are sourced from Ausgrid's financial system and some of these information (e.g. capex) are also reported to the AER via annual RIN. Actual CPI are

[2] AER, Ausgrid Final Decision 2015-19 Attachment 16 – Alternative Control Services, p 16-32

	calculated using the AER's approved methodology based on actual data published by the ABS.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The source information for RIN table 3.3.2 is the same as for RIN table 3.3.1, with the additional inclusion of data from Ausgrid's Fixed Asset Register (FAR) to create a method to allocate the existing RAB values into RIN asset categories. The Fixed Asset Register has disaggregated replacement cost data for 2016/17 with details of splits between distribution and transmission system assets.

Ausgrid has relied on the 2016/17 "Book Value Land by Property Usage" report from Ausgrid's FAR to determine the split of Ausgrid's "Land and Easements" RAB class. This was required to meet the AER's requirement to allocate system land to the respective substation RIN category as required.

Methodology and Assumptions

Allocation to RIN asset categories

Consistent with the prior year, the methodology used for RIN table 3.3.2 included a detailed allocation of RAB asset classes to the RIN asset categories. This is consistently applied to the opening RAB values, inflation additions, straight line depreciation, actual additions and disposals.

Direct allocation was utilised where possible in line with the Standard Approach. RAB assets that could not be directly allocated utilised the depreciated replacement cost approach described in the Instructions. As such, this approach produced the best estimate of the information being sought in the RIN within the confines of the Standard Approach.

This overall methodology is detailed as follows:

1) Assets that could be directly allocated to RIN categories were allocated in full.
2) For the remaining assets that required allocation across a number of RIN classes, in particular between overhead and underground classifications or zone and distribution substations, these were assigned an allocator based on depreciated replacement costs. The allocators were created as follows:
    a. Ausgrid's Fixed Asset Register (FAR) was used to estimate weightings for 2016/17. The FAR was used to determine the depreciated replacement cost of assets by financial class. Assets by financial classes aggregate to form RAB assets for the RFM. This method is in line with the Instructions; part (c) of the *RAB allocation approach* section. The FAR data provided a more accurate basis for estimation of the depreciated replacement cost in comparison to using the physical asset data (Template 6), the unit rate replacement cost and the weighted average asset age as recommended by the AER in part (c).

       Each disaggregated RAB asset was allocated a specific RIN asset category, being:
        i. overhead assets less than 33kV
        ii. underground assets less than 33kV
        iii. zone substations
        iv. distribution substations
        v. overhead assets greater than 33kV
        vi. underground assets greater than 33kV
    b. The weightings were applied to the RAB Asset values calculated using the AER's RFM. This approach allowed for reconciliation to RIN Table 3.3.1 as required.
3) Steps 1 and 2 were repeated for each RFM (distribution, transmission and metering RFMs).
4) In line with RIN table 3.3.1, Metering Services related assets (i.e. direct metering assets, direct IT metering assets and non-system assets allocated to Metering), together with public lighting asset values, form part of ACS.
5) Public Lighting data was sourced from the Public Lighting model. This was categorised into the "Other Assets with Long Lives" class.

6) As Ausgrid's RAB has system land and easements in a single asset class ("Land and Easements"), zone system land and distribution system land was segregated from easements. This was undertaken using the FAR to initially isolate the easements, and then separate the system land into zone and distribution proportions using book values of land by property usage.

7) RAB assets that could not clearly be attributed to a RIN category were assigned to an 'Other' category based on standard life. The majority were "Other Assets with Long Lives" which includes the following:

    a. Communications equipment
    b. Public lighting
    c. Emergency spares
    d. Furniture, fittings, plant and equipment
    e. Motor vehicles
    f. Non system buildings and land
    g. Other non-system assets
    h. Equity Raising Costs (for 2010-2013)
    i. Load control assets

8) The "Other Assets with Short Lives" mainly consists of IT related assets. Assets attributable to overhead categories may include assets associated with underground assets (e.g. underground to overhead connections (UGOHs)). These have not been segregated. Easement assets have not been included outside of the easements category.

9) Zone Substations includes ancillary assets, as well as zone buildings and zone land

10) As a final step, the consolidated template was separated into actual and estimated information. This was based on direct attribution (step 1 above) or allocation (step 2). It was assumed that all RAB data that could directly be applied to a RIN category was deemed as accurate and therefore actual, whereas allocated RAB was less accurate and therefore estimated.

<u>Opening RAB balance</u>

The opening RAB balances have been updated to correct for the error mentioned above, and have been sourced from the amended RFM rather than the 2015/16 EBRIN closing balances.

<u>Depreciation</u>

Consistent with the approach for RIN table 3.3.1, we have taken into account forecast depreciation (i.e. forecast straight line depreciation in the PTRM from the AER's final decision) for SCS and metering assets.

<u>Public lighting model</u>

Consistent with prior years, public lighting data was sourced from the Public Lighting model and categorised into the "Other Assets with Long Lives" class.

Every year, a certain amount of remaining public lighting assets are replaced earlier than the end of their asset lives at the request of customers. For those assets Ausgrid requests that the remaining asset value is paid by the customer. The amount is then deducted from the residual RAB at the end of the financial year, i.e. the closing RAB. We have reflected these deductions in the closing RAB for 2015/16, which becomes the opening RAB for 2016/17, as well as the closing RAB for 2016/17.

Use of estimated information

Ausgrid has treated allocated RAB data as estimated, which is explained in greater detail above. As per the Instructions, the allocation method was necessary where RAB assets could not be directly attributed to a single RIN asset category.

The allocation methodology provided by the AER alters the underlying actual data, and therefore cannot be treated as actual data. As indicated above, the approach produced the best estimate of the information being sought in the RIN within the confines of the Standard Approach.

Notwithstanding the estimated nature of the data in RIN table 3.3.2, at an aggregated level this data reconciles to the data in RIN table 3.3.1.

Material accounting policy changes

Not applicable.

3.3.3 Total disaggregated RAB asset values

Compliance with requirements of the notice

The RAB worksheet required Regulatory Asset Base data to be allocated into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between NS, SCS and ACS as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required.

This overarching requirement has been met with information provided in all three templates: the Worksheet 3.3 Actual Information template, Worksheet 3.3 Estimated Information template, and the Worksheet 3.3 Consolidated Information template. These worksheets show the various asset categories for which Ausgrid must provide the relevant RAB values. These asset categories are referred to in this section as 'RIN asset categories'.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1 as well as requirements specific to RIN table 3.3.3. These are detailed in Table 3 below which also specifies the actions Ausgrid completed to meet these requirements.

Table 3 Compliance with the RIN for RIN table 3.3.3

Compliance Requirement	Ausgrid's Compliance
Calculation based on the average of opening and closing RAB values.	Ausgrid has averaged the opening and closing RAB values from Table 3.3.2.
Data must be directly reconcilable to opening and closing values in RIN table 3.3.2 for the relevant RIN asset categories.	The data directly reconciles to the opening and closing values for the relevant RIN asset categories in table 3.3.2

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The source for RIN table 3.3.3 is RIN table 3.3.2.

Methodology and Assumptions

In this section we explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made.

Ausgrid has calculated the disaggregated RAB values by averaging the opening and closing values.

The Value of Capital Contributions or Contributed Assets included in the RAB is zero, as these amounts are excluded from the RAB in the RFMs. However we note that there was capital expenditure of $115.9m in 2016-17 on these items under network services and standard control services.

Use of estimated information

Where an allocation to a RIN asset category has taken place, the resulting value is classified as estimated values. Therefore, where the asset balances in Table 3.3.2 have been identified as estimated, the corresponding balance in Table 3.3.3 is considered estimated and similarly for those balances identified as actual.

Material accounting policy changes

Not applicable.

3.3.4 Asset lives

Compliance with requirements of the notice

The RAB worksheet required Regulatory Asset Base data into aggregated categories of capital inputs: namely overhead lines, underground cables, transformers and other capital. Furthermore, a split between NS, SCS and ACS as per the definitions in Chapter 9 of the Economic Benchmarking Instructions was required. This overarching requirement has been with information provided in through all three templates: the Worksheet 4 Actual Information template, Worksheet 4 Estimated Information template, and the Worksheet 4 Consolidated Information template.

Additionally, compliance with the RIN also involved the requirements detailed above in Table 1, as well as requirements specific to Table 4.3. These are detailed in Table 4 below which also specifies the actions Ausgrid completed to meet these requirements.

Table 4 Compliance with the RIN for RIN table 3.3.4

Compliance Requirement	Ausgrid's Compliance
Asset lives must be reported in accordance with definitions in Chapter 9	Ausgrid has used the definitions as per Chapter 9.
Weightings must be calculated as specified in the Instructions, in order of preference.	Ausgrid has utilised option 1: based on the asset's share of the RAB for the category and expected lives.
Ausgrid must provide actual information where possible; otherwise Ausgrid must provide estimated information.	Ausgrid has utilised a weighting approach and therefore has deemed Table 3.3.4 data as estimated, even though some of the asset values were reported as actual. That is, information pertaining to asset classes that were directly attributed to a RIN asset class (therefore classified as actual) underwent an allocation process to derive the reports to be reported in table 3.3.4. Consequently, these values are reported as estimated.

Details of the steps Ausgrid has taken to comply with this RIN are detailed in sections below.

Source of information

The asset lives for each category for 2016/17 were derived from the RFMs as approved by the AER in its final determination for 2015-19.

Public lighting information for 2016/17 was obtained from the 2015-2019 AER's decision with respect to public lighting.

The allocators used to allocate RAB asset classes into RIN asset categories (for RIN table 3.3.2) are also used in deriving the asset lives of each RIN asset category.

Methodology and Assumptions

The asset lives for each year in the RIN template have been reported in line with the AER's RIN asset categories. Asset lives values for the RAB have been reported in accordance with the Standard Approach detailed in the Instructions.

Where RIN categories comprise a number of RAB assets, asset lives for the whole category are calculated by weighting the lives of individual assets within that category, as explained in the Instructions. Weightings were calculated on the basis of the assets' share of the RAB for that RIN category, in line with the example provided in the Instructions.

The standard and remaining asset lives for each Ausgrid asset category in each year were derived from the RFMs; details on the inputs used in these RFMs are explained above. The first step was to collect the standard lives for each RAB asset class, and apply this as the standard life for the year 2016/17.

1. The next step was to derive the weighted average standard lives and remaining lives for 2016/17 for each RAB asset class.
2. Remaining lives for existing opening RAB as at 1 July 2016 as well as net capex in 2016/17 were weighted based on their real depreciated values within the relevant RFM.
3. After the weighted average standard and remaining lives had been collected for each RAB asset class for 2016/17, the next step was to allocate them into RIN asset categories. In some instances, one RIN category consisted of a number of RFM RAB asset classes. The standard and remaining lives in these cases were

derived by weighting each life by its asset dollar value, and summing the weighted averages as they apply to each RIN category.

4. In other instances, one RFM RAB asset class was split into a number of RIN categories. These weightings were derived from weighting explained above using the Fixed Asset Register (see methodology in Basis of Preparation for RIN table3.3.2). For example, the Ausgrid asset class of ‘Sub-transmission lines’ was allocated into two RIN categories; “Overhead assets 33kV and above’ and ‘Underground assets 33kV and above’.

Assumptions:

- The RFM RAB asset classes of ‘Substations’ and ‘Transformers’ have been allocated across the RIN categories of “Distribution substations including transformers” and “Zone substations”. Given that the AER asset category of Distribution Substations included transformers, Ausgrid considers it is reasonable to assume that the “Zone substations” category should also include its share of transformers.
- Any asset classes that reported a standard or remaining life of “n/a” in the RAB RFM were given no weighting in calculating the weighted average remaining life when allocated to the RIN categories. Therefore, the standard and remaining lives as well as the dollar values for these asset classes were not included in the calculation of the weighted averages for RIN categories.

Use of estimated information

Ausgrid has used estimated information based on the premise that the weighting method has been provided by the AER and cannot be deemed as actual information from Ausgrid.

The Standard Approach set out in the RIN instructions necessitates the data to be estimated. The estimated data is considered to be the best estimate as the method used to derive it is consistent with the RIN instruction and provides an outcome considered to most closely align with that being sought by the RIN.

Worksheet 3.4 – Operational data

3.4.1 Energy delivery

Compliance with requirements of the notice
In this section we demonstrate how the information provided is consistent with the requirements of the Notice.

Compliance Requirement	Ausgrid's Compliance
Energy delivered is the amount of electricity transported out of Ausgrid's network in the relevant Regulatory Year (measured in GWh). It must be the energy metered or estimated at the customer charging location rather than the import location from the TNSP. Energy delivered must be actual energy delivered data, unless this is unavailable. Where Actual Information is not available for the most recent reporting period, Energy Delivery data for that period may be reported on an accrual basis. Peak, shoulder and off-peak periods relate to Ausgrid's own charging periods.	Ausgrid has reported the electricity delivered for 2017 which underlies the 2017 revenues reported in Worksheet "3.1 Revenue" of the RIN. Due to financial year end reporting deadlines the 2017 revenues necessarily rely partly on accrued electricity consumption. Accordingly energy delivered has been reported on an accrual basis (as per the compliance requirement) and entered in the "Actual information" RIN template. This will necessarily be the case in all future benchmarking RINs.
Ausgrid must report energy delivered in accordance with the category breakdowns as per the definitions provided in chapter 9. Ausgrid must only report 'Energy Delivery where time of use is not a determinant' (DOPED0201) for Energy Delivery that was not charged for peak, shoulder or off-peak periods.	The reported electricity delivered is in accordance with the RIN definitions and instructions.
Ausgrid must report energy delivered in accordance with the category breakdown as per the definitions provided in chapter 9. The category breakdown must be consistent with the customer types reported in Table 5.2.1.	<u>Ausgrid notes that the RIN template does not contain a Table 5.2.1. Ausgrid assumes that the intended reference is to Table 3.4.2.1.</u> Ausgrid further notes that, as has been the case with prior benchmarking RINs, the category breakdown in Table 3.4.1.4 is different to that in Table 3.4.2.1, the latter of which includes DOPCN0105 (Unmetered customer numbers), while no row for "unmetered" exists in Table 3.4.1.4. <u>This makes it impossible to comply with the requirement that "The category breakdown must be consistent with the customer types reported in Table 5.2.1".</u> Consistent with the approach taken in prior benchmarking RINs, in Table 3.4.1.4 Ausgrid has entered unmetered energy deliveries into DOPED0505 (Other customer class energy deliveries).
Ausgrid must report energy input into its network as measured at supply points from the TNSP and other DNSPs in accordance with the definitions provided in chapter 9. Ausgrid must only report energy against 'Energy received from TNSP and other DNSPs not included in the above categories' (DOPED0304) where it is not	The reported electricity received is in accordance with the RIN definitions and instructions. The energy reported is that measured at Ausgrid's boundary. The energy can be allocated to peak, shoulder and off-peak periods.

Compliance Requirement	Ausgrid's Compliance
possible to allocate the energy received into on-peak, shoulder and off-peak times.	
Based on the AER Instructions "Energy delivered *[sic – should read "received"]* must be reported in accordance with the category breakdown as per the definitions provided in chapter 9. Ausgrid is required to report energy received from Non-residential Embedded Generation by time of receipt. Ausgrid is required to report back cast energy received from Residential Embedded Generation only if it records data for these variables (DOPED0405–DOPED0408), however Ausgrid is required to provide this data for future Regulatory Years. 'Energy received from Embedded Generation not included in above categories' (DOPED0404 and DOPED0408) includes energy received from Embedded Generation on an accumulation basis and not measured by the time of receipt. Ausgrid must only report energy received in DOPED0404 where it is not possible to allocate the energy received into on-peak, shoulder and off-peak times (DOPED0401–DOPED0403 and DOPED0405–DOPED0407). When completing the templates for Regulatory Years subsequent to the 2013 Regulatory Year, if Ausgrid can provide Actual Information for the Residential Embedded Generation variables (DOPED0405–DOPED0408) it must do so; otherwise Ausgrid must provide Estimated Information.	The reported electricity received is in accordance with the RIN definitions and instructions. Due to financial year end reporting and RIN reporting deadlines the 2017 Embedded Generation energy delivered associated with roof-top solar generation (both residential and non-residential) necessarily relies partly on accrued electricity generation. Accordingly the 2017 Embedded Generation energy delivered associated with roof-top solar generation (both residential and non-residential) has been reported on an accrual basis (as per the energy delivered compliance requirement and in line with the specific compliance requirement that "if Ausgrid can provide Actual Information for the Residential Embedded Generation variables it must do so; otherwise Ausgrid must provide Estimated Information") and entered in the "Estimated information" RIN template. This will necessarily be the case in all future benchmarking RINs.

Source of information

Table 3.4.1 requests both energy delivered and energy received. Ausgrid relies on separate data sources for both measures.

The energy delivered data in Tables 3.4.1, 3.4.1.1 and 3.4.1.4 is sourced from SAP via the Business Intelligence (BI) system which collates customer volume consumption for billing purposes. The reported energy delivered is a combination of billed and accrued information.

The energy received data in Tables 3.4.1.2. and 3.4.1.3 is a combination of actual and accrued information, and is sourced from a combination of:

- Ausgrid's Bulk Supply Point (BSP) data processing system, which relies on market-standard metered data to calculate the half-hourly energy flows into the network from TransGrid, other DNSPs and non-residential/non-solar embedded generators; and
- The SAP BI system which is the source for the requested data on exports to the network from small embedded generators (most notably solar PV exports).

Methodology and Assumptions

Table 3.4.1 is primarily based on metered data from the SAP BI system and BSP system, but does include elements of accrued/estimation data – see "Use of estimated information" below for details.

Use of estimated information

Due to financial year end reporting and RIN reporting deadlines the 2017 Embedded Generation energy delivered associated with roof-top solar generation necessarily includes accrued electricity generation. The methodology adopted for these estimates, which is considered to be the best estimate of the information sought in this template, involves the following steps:

1. Estimate what 2017 roof-top solar generation will be when billed meter-reading for 2017 is finally completed. This estimate was based on the available 2017 billed meter-reading as at June 2017 from the SAP BI system, as well as accrued 2017 energy as at June 2017, also from the SAP BI system.

2. A SAP BW system query was run on 2017 billed meter-reading as at 22 August 2017 to extract the detailed time-of-use breakdown of solar generation required for the RIN. The relative proportions of energy by residential and non-residential and by time-of-use from the BI system query results were then applied to the GWh volumes estimated from step 1.

3.4.2 Customer numbers

Compliance with requirements of the notice

In this section we demonstrate how the information provided is consistent with the requirements of the Notice, specifically section 3.4.2 of the instructions and definitions.

Compliance Requirement	Ausgrid's Compliance
Distribution Customers for a Regulatory Year are the average number of active National Meter Identifiers (NMIs) in Ausgrid's network in that year (except for Unmetered Customer Numbers). Each NMI is counted as a separate customer. The average is calculated as the average of the number of NMIs on the first day of the Regulatory Year and on the last day of the Regulatory Year. Both energised and de-energised NMIs must be counted. Extinct NMIs must not be counted. For unmetered customers, the Customer Numbers are the sum of connections (excluding public lighting connections) in Ausgrid's network that do not have a NMI and the energy usage for billing purposes is calculated using an assumed load profile (examples include bus shelters, security lighting and traffic signals where not metered). Public lighting connections must not be counted as unmetered customers.	The reported customer numbers are in accordance with the RIN definitions and instructions. In relation to unmetered customers Ausgrid does not allocate a NMI to all unmetered connections, however it does group connections together on a customer basis and allocate NMIs to those customers for billing purposes. Those connections whose consumption is measured by reference to a load table approved by AEMO are grouped together for each customer for billing purposes and allocated a NMI which is active in the market. Those connections whose consumption is not measured by reference to a load profile table approved by AEMO for use in the market are not allocated an active market NMI but are allocated a non-active NMI by Ausgrid and consumption is measured by reference to a daily average load calculation.
Ausgrid must report Customer Numbers in accordance with the categorisation as per the definitions provided in chapter 9. Ausgrid must report customers against 'Other Customer Numbers' (DOPCN0106) only when customers cannot be allocated to the other customer classes (DOPCN0101–DOPCN0105).	The reported customer numbers are in accordance with the RIN definitions and instructions.
Ausgrid must report Customer Numbers in accordance with the category definitions provided in chapter 9. The locations are: CBD, urban, short rural and long rural.	The reported customer numbers are in accordance with the RIN definitions and instructions.

Source of information

Table 3.4.2 requests separate breakdowns of customer numbers into customer class categories and into location-based categories. Ausgrid relies on separate data sources for both measures.

<u>The customer class breakdown in Table 3.4.2.1</u> is sourced from the SAP Business Warehouse (BW) system query "Accrual Tariff Usage - Installation Count". The customer count represents the number of distinct accrued

installations as at the end of each month. The default parameter for this report includes sites with a status of occupied or vacant.

The location-based breakdown in Table 3.4.2.2 is sourced from Ausgrid's Outage Management System (OMS) which contains customer numbers on the location-based breakdown requested by the RIN.

The following provides additional contextual information on the data contained within OMS.

There are applications (directly linked to OMS) and reference tables outside OMS that hold information relevant to performance reporting. Specifically:

- Electrical connectivity details (including where NMIs are attached to the network): source is GIS.
- NMI details: SAP Customer Care System (CCS) & B2B.
- Reporting Reference tables: Feeder categorisation (CBD, urban etc) and annual Tmed threshold values.

The reporting reference tables provide the capability of separating outage events, NMIs affected and NMIs fed by Feeder Category.

Methodology and Assumptions

Table 3.4.2.1

Outputs from SAP via the Business Warehouse query "Accrual Tariff Usage - Installation Count" form the basis for the data in Table 3.4.2.1.

Table 3.4.2.2

Once the data is extracted into the reporting environment it is combined with the reference feeder category and NMI status (active vs. inactive) to generate the required performance measures.

A Business Objects report provides the summarised results for customer numbers by feeder category as required for the tables described.

It is recognised that the feeder category and number of customers may change throughout the year and therefore that data is as at the end of the financial year.

Key assumptions used in method:

- All outage events are correctly recorded in OMS (times, NMIs affected, Trigger, et al)
- All reference tables are accurate (feeder categories).

Use of estimated information

Table 3.4.2.2

The data in this table is estimated information. Actual information could not be provided in relation to this table because in the process of reconciling data for use in complying with the Economic Benchmarking RIN, a difference in customer totals was identified between SAP's Business Warehouse query "Accrual Tariff Usage - Installation Count" and Ausgrid's Outage Management System (OMS). Consequently Ausgrid has estimated the values of DOPCN0201 to DOPCN0204 as shown below. To calculate the feeder category allocation, reports were extracted on 30/6/2017 and the percentage breakdowns by location were calculated. The global percentages are expected to have been minimally impacted by the reporting problem and for this reason are considered to produce the best estimate of the customer numbers in the categories being sought by the RIN.

The estimation process for DOPCN0201 to DOPCN0204 was as follows:

1. Use the total customer count value from DOPCN01 (that is, the customer count from the SAP Business Warehouse customer count query).
2. Then, apportion the splits across feeder categories in DOPCN0201 to DOPCN0204 on the basis of the splits obtained on the 30/6/2017 OMS data extract.

The estimation process adopted for the 2017 RIN is the same as was applied for previous Benchmarking RINs.

3.4.3 System demand

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice. Specifically, for sections 3.4.3.6 and 3.4.3.7:

Compliance Requirement	Ausgrid's Compliance
Table 3.4.3.6 Demand supplied (for customers charged on this basis) – MW measure Ausgrid is only required to complete this table if it charges customers for Maximum Demand supplied. If Ausgrid does not charge customers on this basis then Ausgrid should enter '0'. Ausgrid must report Maximum Demand amounts for customers that are charged based upon their Maximum Demand as measured in MW. Where Ausgrid cannot distinguish between contracted and measured Maximum Demand, demand supplied must be allocated to contracted Maximum Demand.	Ausgrid does not charge customers for "contracted" maximum demand. Ausgrid has reported the "measured" maximum demand for 2017 which underlies the 2017 revenues reported in Worksheet 3.1 of the RIN. Due to financial year end reporting deadlines the 2017 revenues necessarily rely partly on accrued demand.
Table 3.4.3.7 Demand supplied (for customers charged on this basis) – MVA measure Ausgrid is only required to complete this table if it charges customers for demand supplied. If Ausgrid does not charge customers on this basis then Ausgrid must enter '0'. Ausgrid must report Maximum Demand amounts for customers that are charged based upon their Maximum Demand as measured in MVA. Where Ausgrid cannot distinguish between contracted and measured Maximum Demand, demand supplied must be allocated to contracted Maximum Demand.	Ausgrid does not charge customers for "contracted" maximum demand. Ausgrid has reported the "measured" maximum demand for 2017 which underlies the 2017 revenues reported in Worksheet 3.1 of the RIN. Due to financial year end reporting deadlines the 2017 revenues necessarily rely partly on accrued demand.

Source of information

<u>Tables 3.4.3.1 to 3.4.3.4</u>

Data provided in Table 3.4.3.1, 3.4.3.2, 3.4.3.3, and 3.4.3.4 is obtained from Ausgrid's Spatial Demand Forecast System.

<u>Table 3.4.3.5</u>

<u>Sources of Information</u>

The following data sources were used for the estimation of Power Factor (PF):

1. <u>SAS data (11kV – 132 kV lines)</u>

   Real and reactive power from transformers or feeders in zones in the SAS database.
   The SAS database holds, among others, metering data from individual transformers and feeders in substations. The data was used to calculate the PF for 11kV, 33kV, 66kV and 132kV lines.

2. <u>Power Quality meter data (Low Voltage distribution lines)</u>

   Real and reactive power data for low voltage feeders was obtained from selected Distribution Centres equipped with Power Quality Monitors.

22kV and SWER lines

No data exists for 22kV feeders or SWER lines (12.7kV). Experience shows that a value of 0.9 is usually a good fit.

Exclusions

Ausgrid maintains a legacy 5kV distribution network out of two Zone Substations (Camperdown and Blackwattle Bay). Camperdown Zone is currently being converted to 11kV distribution network. Blackwattle Bay Zone is planned for conversion to an 11kV distribution network in the period 2017-2018. Neither zone records MW so it is not possible to provide Power Factor for the 5kV level. If an estimation of Power Factor for 5kV was required, figures for 11kV would be used as the aggregated load types would be broadly similar.

Tables 3.4.3.6 to 3.4.3.7

The demand supplied data is sourced from SAP via the Business Intelligence (BI) system which collates customer volume consumption for billing purposes. The reported demand is a combination of billed and accrued information.

Methodology and Assumptions

Tables 3.4.3.1 to 3.4.3.4

Ausgrid performs weather normalisation at 10% and 50% POE using simulation technique at the zone substation level on a yearly basis. Power factors and diversity factors are measured and calculated as close to the system peak as possible to enable conversion between MW and MVA and calculation of coincident system maximum demand. Key assumptions include:

- All load data is obtained from Ausgrid's SCADA system or metering points. All weather data is obtained from Bureau of Meteorology weather stations.
- Maximum demand for the financial year includes period 1 May – 30 June from the previous financial year. Ausgrid's winter season covers period 1 May – 31 August and Ausgrid believes it is impractical to divide the winter season across two financial years.
- Ausgrid interprets "transmission connection point" as any "subtransmission substation", "zone substation" and "High Voltage Customer (HVC)" connected at 132kV within Ausgrid's network area. Note there are three Ausgrid zone substations not connected at 132kV within Ausgrid's network, but supplied from Endeavour Energy at 66kV and 33kV. Note also that Endeavour Energy does not have a transmission licence and that demand from these zone substations would be included in Endeavour's RIN data. Consequently, demand from these zone substations is not included in the aggregate data at the transmission connection point, but is included in the aggregate data at the zone substation level. These zone substations are Epping 66/11kV, Leightonfield 33/11kV and Hunters Hill 66/11kV zone substations. Tables 3.4.3.1 and 3.4.3.3 are the summation of individual zone substation maximum demands, irrespective of the primary voltage of the zone substation.
- 10% and 50% POE maximum demand is obtained by selecting the corresponding percentile of the maximum demand from 2000 simulated summer & winter seasons. Simulation is based on the daily maximum demand and daily average temperature relationship observed for the corresponding season.
- Where a particular substation is not weather dependent, then no weather adjustment is applied and therefore their 10% and 50% POE maximum demand will be the same as their raw maximum demand.
- All HVCs and generators connected at 33kV or above do not have weather adjustment applied and therefore their 10% and 50% POE maximum demand will be the same as their raw maximum demand.
- The values for the Non-coincident Summated Raw System Annual Maximum Demand in Tables 3.4.3.1, 3.4.3.2, 3.4.3.3 and 3.4.3.4 are based on the greater of the summer or winter raw MW for the individual substations and HVCs. Therefore, these values will be comprised of individual summer and winter raw MW from individual substations and HVCs summated together (i.e. summation of demand from different seasons).
- The values for the Coincident Summated Raw System Annual Maximum Demand in Tables 3.4.3.1, 3.4.3.2, 3.4.3.3 and 3.4.3.4 are based on the season where the overall Ausgrid network maximum demand was greater. Therefore, these coincident summated raw totals will summate together the individual MW from individual substations and HVCs from the same season.

- In tables 3.4.3.1 and 3.4.3.3, annual system maximum demand at the zone substation level, the values are derived from a summation of the individual zone nodes as measured at the secondary voltage. Where there are sources of embedded generation connected below zone substation level, values are net of impacts.
- In tables 3.4.3.2 and 3.4.3.4, annual system maximum demand at the transmission connection point (TCP) level, the values are derived from a summation of the individual TCP nodes as measured at the secondary voltage. These measured values include both the supply from TransGrid and from 132kV connected embedded generators. Where there are other sources of embedded generation connected below transmission connection point level, values are net of impacts.

Table 3.4.3.5

Power Factor derivation method:

As specified in the instructions and definitions guide, average PF was calculated from summing the 15 min or 30 min recorded real (MW = P) and reactive (MVAr = Q) power readings and calculating the PF using the following formula:

$$PF = \frac{abs(P)}{\sqrt{P^2 + Q^2}}$$

The total site PF of an individual site for a given Regulatory Year was calculated from the Real and Reactive power as recorded at the non-coincident peak for the particular measurement point.

The overall network wide PF (DOPSD0301) is calculated using the coincident raw system annual maximum demand MW (DOPSD0110) and MVA (DOPSD0210) values at the transmission connection point level.

Although some sites have PQ meters installed that provide PF values in the range of -1 to 1, where possible, the above formula was applied to provide a better measure of the relative amplitude of the reactive power on the network when aggregating PF network wide.

Data sources for the individual line items were:

DOPSD0302 Average power factor conversion for low voltage distribution lines

- Data recorded at a non-coincident peak during a 1 week observation period in Feb 2017.
  Average of calculated PF recorded at LV terminals of Distribution Substations
  Data obtained from PI Historian database.

DOPSD0303 Average power factor conversion for 11 kV lines

DOPSD0306 Average power factor conversion for 33 kV lines

DOPSD0307 Average power factor conversion for 66 kV lines

DOPSD0308 Average power factor conversion for 132 kV lines

- Data recorded at a non-coincident peak for 12 month period ending June 2017.
  Average of calculated PF recorded at revenue meters on the distribution network
  Revenue metering data obtained from Meter Data Warehouse using SAS data extraction

DOPSD0304 Average power factor conversion for SWER lines

DOPSD0305 Average power factor conversion for 22 kV lines

- For 22kV and SWER, there are no systems in place to measure the real and reactive power. The PF was estimated by Ausgrid distribution planning.

Note: *The data has been sourced from various databases some of which are implemented for purposes other than power quality (Revenue metering and the like).*

Power Factor was calculated for all levels of power (i.e. not at system peak) and no correction was made for weather.

Tables 3.4.3.6 to 3.4.3.7

The volumes which are relevant to Tables 3.4.3.6 and 3.4.3.7 are the sum of the twelve individually monthly billed kW or kVA (depending on the tariff structure) volumes for each tariff. For the purposes of completing this Notice, the value entered is the WAPC volume divided by twelve. This is done to put the "chargeable maximum demand" amounts reported in the same context as the rest of the Tables in Table 3.4.3, which deal with maximum demand at various levels of the network.

Use of estimated information

All data provided as estimated values in this section below is based on the best possible estimates available to Ausgrid at the time of preparation for this economic benchmarking RIN.

Tables 3.4.3.1 to 3.4.3.4

Data required in populating Tables 3.4.3.1, 3.4.3.2, 3.4.3.3 and 3.4.3.4 is based on actual information.

Tables 3.4.3.5

Ausgrid has used estimated information for the following data points:

Voltage Level	Regulatory Year	Reason
22kV	Current (2016/17)	No data available
SWER	Current (2016/17)	No data available

The basis for the estimates:

- For 22kV and SWER, the estimates were the data used by Ausgrid distribution planning. Based on research done for SWER lines, the value chosen appears appropriate.

Tables 3.4.3.6 to 3.4.3.7

None

Worksheet 3.5 – Physical assets

3.5.1 Network capacities variables

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

Tables 3.5.1.1 and 3.5.1.2

The data for table 3.5.1.1 and table 3.5.1.2 is sourced from Ausgrid's Geographical Information System (GIS) – the repository for spatial asset data. Extracts are run at 6 monthly intervals providing a variety of different summaries of the asset information held within the system. This spatial data report contains lengths of mains by conductor/cable code.

Tables 3.5.1.3 and 3.5.1.4

The source data for tables 3.5.1.3 and 3.5.1.4 are sourced from different locations depending on voltage, as the data requested is not retained by Ausgrid in the format required. Specifically, the original sources are sourced from Ausgrid's Geographical Information System (GIS) – the repository for spatial asset data.

Overhead and Underground Low Voltage

LV Cable and conductor ratings were sourced from the Ratings Impedance Calculator (RIC) where available. The MVA capacity is calculated using the summer ratings and conductor voltage.

Overhead 11kV, SWER and 22kV, and Underground 11kV and 5kV

The data is sourced from the Ausgrid's modelling database used by the Distribution Planning section. This extract contains the zone number, panel number, cable code and description, and the summer OH/UG ratings. SWER and 22kV data comes from LID network line database. The MVA capacity is calculated using the summer ratings and conductor voltage.

Overhead and Underground 33kV, 66kV and 132kV

This data is sourced from 'RIC' the Ratings and Impedance Calculator, which in turn sources its data from GIS and SAP PM (Plant Maintenance).

The ratings information was obtained from Ausgrid's transmission and sub-transmission ratings report for feeder ratings.

Length information was obtained from a GIS. Information from these sources was mapped and combined to prepare the weighted average capacity figures.

Methodology and Assumptions

Tables 3.5.1.1 and 3.5.1.2

Using the source data, different filters are applied based on the different voltages required. The below table shows the different filters used for the different RIN variables, and the length field summated to acquire the overall total length.

Variable	Asset Category	Operating Voltage	Length Data Used
Overhead Low Voltage	LV Line	LV	Length Total ODRC (kms)
Overhead 11kV	HV Line	11kV	Length Total ODRC (kms)
Overhead SWER	HV Line	12.7kV	Length Total ODRC (kms)
Overhead 22kV	HV Line	22kV	Length Total ODRC (kms)
Overhead 33kV	OH	33kV	Length Conductor Total (kms)
Overhead 66kV	OH	66kV	Length Conductor Total (kms)
Overhead 132kV	OH	132kV	Length Conductor Total (kms)
Underground Low Voltage	LV Cable	LV	Length Total ODRC (kms)
Underground 5kV	HV Cable	5kV	Length Total ODRC (kms)
Underground 11kV	HV Cable	11kV	Length Total ODRC (kms)
Underground 22kV	HV Cable	22kV	Length Total ODRC (kms)
Underground 33kV	UG	33kV	Length Conductor Total (kms)
Underground 66kV	UG	66kV	Length Conductor Total (kms)
Underground 132kV	UG	132kV	Length Conductor Total (kms)

<u>Table 3.5.1.3 and Table 3.5.1.4 Global Assumptions</u>

All voltages used in MVA calculations are nominal voltages.

All ratings are based on normal summer day ratings.

Unless inherent in rating data supplied, all limitations are thermal. Voltage drop considerations are not contained within the data sets available for use in these calculations.

Variable DPA0301 – Overhead low voltage distribution

Due to the absence of a data set with both cable length and rating information, the basic methodology applied is to use the extract that has cable length by cable code and match this with cable ratings data.

Using the GIS "Network Age" report as the original source (specified above), the required data set is selected by applying a filter of "LV line" on field 'Asset Category', and "LV" on 'Primary Operating Voltage'.

Each row of data is then manually given a 'Conductor Material' attribute based on the description of the cable code (ie. AAAC, AAC, HDCU). Using this field and the 'Cable Size' field, a pivot table of the data is then created to provide a total length by Conductor Material and Cable Size.

The corresponding ratings are then assigned to each of these summarised records, using data sourced from the Ratings & Impedance Calculator (RIC) database. When insufficient information is recorded in Ausgrid's systems regarding the conductor material or size, the records are excluded from the calculation (approximately 6% of low voltage conductors have been excluded). If there is a direct mapping to the conductor code data held in the RIC tables, the corresponding normal summer day rating at 75 degC (or the next available closest temperature rating) is used. If there is no direct mapping for ratings and the total length installed is greater than 1km, the corresponding ratings are estimated using the ratings for the closest conductor size with the same material.

These values are then used to calculate the weighted average in MVA across all cable codes, with the assumption that all conductors are multi-phase and the standard single phase voltage is 240V.

[For 2016, the previous RIN working sheets were used as a source for ratings, where available, to avoid having to calculate ratings from scratch. This was achieved by using a 'lookup' based on cable code.]

Variable DPA0401 – Underground low voltage distribution

Due to the absence of a data set with both cable length and rating information, the basic methodology applied is to use the extract that has cable length by cable code and match this with cable ratings data. As cable ratings are different for duct laid and direct laid cable, a second data extraction from GIS was used to provide a split by cable code of the proportions that are direct laid and duct laid.

Using the GIS "Network Age" report as the original source (specified above), the required data set is selected by applying a filter of "LV cable" on field 'Asset Category', and "LV" on 'Primary Operating Voltage'. The duct and direct laid percentages are then inserted for each row based on a lookup from the GIS sourced data, and the total length for the row then split into a duct laid length and direct laid length using the given proportions. Each row of data is then manually given an 'Insulation Type' and 'Conductor Material' attribute based on the description of the cable code. Using these two fields and the 'Cable Size' field, the data is then summarised to give the total, direct laid and duct laid lengths by Insulation Type, Conductor Material and Cable Size. If there were no available construction type breakdown between direct and duct length based on any particular cable code, 100% of that cable length is assumed to be direct laid construction type (this impacts less than 0.5% of conductor records).

The direct and duct laid ratings are then assigned to each of these summarised records, using data sourced from the RIC database. Where the Insulation Type or Material is unknown, these records were ignored. If there is a direct mapping to the data held in the RIC tables, the corresponding summer rating for soil thermal resistivity of 1.2 K.m/W is used. If there is no direct mapping and the total length installed is greater than 1km, the corresponding ratings for direct laid and duct laid cables were estimated using the ratings for the closest cable size with the same material.

These values are then used to calculate the weighted average MVA across all cable codes, with the assumption that all cables are multi-phase and the standard single phase voltage is 240V.

[For 2016, the previous RIN working sheets were used as a source for ratings to avoid having to calculate ratings from scratch. This was achieved by using a 'lookup' based on cable code.]

Variables DPA0304, DPA0305 and DPA0306 - Overhead 11 kV, SWER and 22kV & Variables DPA0402 and DPA0405 Underground 5kV and 11kV

Data has been extracted from the 'Sincal Extract' database for all sections with a length > 0m. The data has been split into 5 different sets for the five different variables. Records were split between Overhead and Underground based on overhead sections having a 'section_lay' = 5, and underground sections having a 'section_lay' = 1,2,3,4 and 6.

Within the underground Sincal data, the 'feeder_volts' field was used to split between 5kV and 11kV.

Within the 11kV overhead Sincal data, the SWER records were selected using the 'zone_number'/'panel_group' information for the known SWER feeder and section, and the known cable codes represented on that feeder. The 22kV records were selected using the 'zone_number'/'panel_group' information for the known 22kV feeder, and the known cable codes represented on that feeder. Where the total section lengths for each cable code exceeded the known lengths for that code at that voltage, records were assigned to make up the known length.

This is because Sincal does not record voltages other than 5kV and 11kV therefore manual assignments were required above.

In calculating the MVA rating, the normal summer rating was used for underground sections and the normal summer day rating was used for overhead sections. Within the data set there is no information available to indicate whether a section is single phase or multiple phase, as such all calculations are based on multiple phase with the exception of SWER. The additional assumption is that circuit voltage is the nominal voltage, i.e. 5kV, 12.7kV, 11kV or 22kV.

Conductor ratings for 22kV and SWER 12.7kV were sourced from Ausgrid's LID system to extract a node to end report for each 22kV and SWER section. Individual sections were then collated together (totals). The node to end report includes section length and rating.

Variables DPA0307, DPA0309, and DPA0311 – Overhead 33kV, 66kV and 132kV & Variables DPA0409, DPA0410 and DPA0412 – Underground 33kV, 66kV and 132kV

Using the R03 report sourced from RIC, the data is filtered selecting RTNG TYPE (Rating Type) = ASGN. These data records are then merged with the feeder length data (and an overhead and underground length is assigned to each feeder record. Where the feeder summer normal current rating is 0, 1, 99999 or blank the record is marked as to be ignored. Where the ampere rating is populated, yet the MVA is not, the MVA is calculated using the assumption that all feeders are 3 phase and at nominal voltage, and that the same rating applies to both UG and OH portions of each individual feeder. The weighted average MVA is then calculated for each voltage for overhead and underground construction types.

Use of estimated information

Tables 3.5.1.1 and 3.5.1.2

No estimates were used in the completion of these tables.

3.5.2 Transformer capacities variables

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

Table 3.5.2.1

Variable DPA0501 - Distribution transformer capacity owned by utility

The information used for this variable is sourced from data in SAP PM (Plant Maintenance).

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

As transformer capacity owned by HV customers is not stored by Ausgrid, the secondary method of using the summation of individual customer maximum demands has been used. This interval data is sourced from the Meter Data Warehouse (MDW), using Business Warehouse network billing data.

Variable DPA0503 - Cold spare capacity included in DPA0501

Data for this variable has been sourced from SAP PM (Plant Maintenance).

Table 3.5.2.2

Variables DPA0601, DPA0602 and DPA0603 - Total installed capacity for first step transformation where there are two steps to reach distribution voltage, Total installed capacity for second step transformation where there are two steps to reach distribution voltage & Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage

The information used for this variable is sourced from data in SAP PM (Plant Maintenance).

Variable DPA0604 - Total zone substation transformer capacity

Sum of variables DPA0601, DPA0602, DPA0603 and DPA0605.

Variable DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604

The information used for this variable is sourced from data in SAP PM (Plant Maintenance).

Methodology and Assumptions

Table 3.5.2.1

Variable DPA0501 - Distribution transformer capacity owned by utility

Distribution transformer data has been extracted from SAP PM via Business Objects. Filters are applied during the extraction to select only distribution transformers with an Owner = Ausgrid or blank. The data in the file has then been processed to highlight records for transformers that were in commission in the financial year ('Include' = Y). The 'Rated Power Nameplate (kVA)' value is then summated for all of these transformers, and converted to MVA.

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

Half-hourly interval data for each NMI is obtained from the Meter Data Warehouse (MDW) for the 12 month regulatory year. This data is processed to determine the maximum demand (30 minute average) interval (in kW) for each NMI. Further analysis is undertaken to calculate the kVA, summation and converted to a total MVA figure.

Variable DPA0503 - Cold spare capacity included in DPA0501

The method used was to extract all distribution transformers within SAP PM that are allocated as spares in the Ausgrid corporate system. The total rated power nameplate in MVA was calculated.

Table 3.5.2.2

Variable DPA0601 - Total installed capacity for first step transformation where there are two steps to reach distribution voltage

Data has been extracted from SAP PM via Business Objects. Filters are applied during the extraction to select only transformers with an Owner = Ausgrid or blank. The data in the file has then been processed to highlight records for transformers that were in commissioned in the financial year ('Include' = Y).

Equipment with an 'Object Type' = TX_SUBTRAN are then selected, and the maximum MVA rating then summated to produce the overall figure for DPA0601.

Variable DPA0602 - Total installed capacity for second step transformation where there are two steps to reach distribution voltage

Data has been extracted from SAP PM via Business Objects. Filters are applied during the extraction to select only transformers with an Owner = Ausgrid or blank. The data in the file has then been processed to highlight records for transformers that were commissioned in the financial year ('Include' = Y).

Equipment with an 'Object Type' = TX_ZONE and 'Operating Voltage' = 66000 or 33000 are then selected, and the maximum MVA rating then summated to produce the overall figure for DPA0602.

Variable DPA0603 - Total zone substation transformer capacity where there is only a single step transformation to reach distribution voltage

Data has been extracted from SAP PM via Business Objects. Filters are applied during the extraction to select only transformers with an Owner = Ausgrid or blank. The data in the file has then been processed to highlight records for transformers that were in commissioned inthe financial year ('Include' = Y).

Equipment with an 'Object Type' = TX_ZONE and 'Operating Voltage' = 132000 are then selected, and the maximum MVA rating then summated to produce the overall figure for DPA0603.

Variable DPA0604 - Total zone substation transformer capacity

As specified, the summation of variables DPA0601, DPA0602, DPA0603 and DPA0605.

Variable DPA0605 - Cold spare capacity of zone substation transformers included in DPA0604

Data has been extracted from SAP PM via Business Objects. Filters are applied during the extraction to select only transformers with an Owner = Ausgrid or blank. The data in the file has then been processed to highlight records for transformers that were spare as of the end of the financial year ('Include' = Spare).

The maximum MVA rating for these records is then summated to produce the overall figure for DPA0605.

Use of estimated information

Variable DPA0501 - Distribution transformer capacity owned by utility

No estimations have been used for this variable.

Variable DPA0502 - Distribution transformer capacity owned by High Voltage Customers

No estimations have been used for this variable, beyond the option given in the RIN instructions as below:

"If the transformer capacity owned by customers connected at high voltage is not available, report summation of individual Maximum Demands of high voltage customers whenever they occur (i.e. the summation of single annual Maximum Demand for each customer) as a proxy for delivery capacity within the high voltage customers."

This is by nature an approximation, since the demand can fluctuate from year to year and is not indicative of the total installed capacity at each customer connection point.

Variable DPA0503, Variable DPA0601, Variable DPA0602, Variable DPA0603 and Variable DPA0605

No estimations have been used for these variables.

3.5.3 Public lighting

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

Data for this section is obtained from SAP PM, extracted via Business Objects using reports built specifically for this request and completion of the Category Analysis RIN.

Methodology and Assumptions

Variable DPA0701 – Public lighting luminaires

The query used in the extraction of this data from SAP PM contains the following logic:

Object Type = LIGHT; AND

SL Rate = 1 or 2; AND

Creation Error = N; AND

Date First Commissioned <= ‘End of Regulatory Year Date’; AND

(Status = Commissioned OR Date Decommissioned > ‘End of Regulatory Year Date’)

This is to ensure that only valid records for Ausgrid maintained luminaires that were in commission at the end of the respective regulatory year are counted. As this data is back calculated off the current data set, master data attribute changes made affect all historical data. As such it is assumed that the current master data against these assets is to be considered accurate for all historical years.

Variable DPA0702 – Public lighting poles

This data is obtained from SAP PM and GIS. Poles are classified as public lighting in this database according to the following criteria:

Object Type = POLE; AND

Creation Error = N; AND

Owner = Ausgrid OR Rural Subsidy Scheme OR ‘blank’

Asset Group = Distribution Mains Streetlighting

Date First Commissioned <= ‘End of Regulatory Year Date’; AND

(Status = Commissioned OR Date Retired > ‘End of Regulatory Year Date’)

This is to ensure that only valid records for Ausgrid owned poles exclusively used for public lighting in commission at the end of the respective regulatory year are counted. As this data is back calculated off the current data set, master data attribute changes made affect all historical data. As such it is assumed that the current master data against these assets is to be considered accurate for all historical years.

Use of estimated information

No estimations have been used for these variables.

Worksheet 3.6 – Quality of services

3.6.1 Reliability

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

Data used to populate Tables 3.6.1.1 and 3.6.1.2 has been taken from outage event records located in Ausgrid's Outage Management System (OMS) and its related reporting environment.

Final outage event records are manually entered into OMS after outage events. Fields within each 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 restoration3
- 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 on the basis of manually entered interruption and switching steps. SAP, CCS and B2B are used to exclude inactive customers (permanently disconnected) 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 and SAIFI are also added to records within the reporting environment. The reporting environment facilitates the extraction of information into to a range of Business Objects reports. The reporting environment also contains reference tables developed within the Tool for Oracle Application Developers (TOAD). One reference table contains feeder categorisation on an annual basis.

A report (*AER RIN 2016 – 17 Sustained Interruption to Supply V1.0*) for the 2016/17 regulatory year was generated from the reporting environment on 10/07/2017. Each report contains a list of outage events with the following key attributes:

[3] There may be multiple restoration times for customer groups within a single outage event due to staged restoration works.

- Event ID
- Reporting date
- Feeder ID
- Feeder Category
- Event Trigger
- Event Hierarchy
- CI
- CMI
- Global SAIDI2
- Global SAIFI2
- Feeder Category SAIDI2
- Feeder Category SAIFI2

Separate entries appear in the list if a single event affected multiple feeders. The report contains separate sections for unplanned, planned and excluded outage events. The report does not contain momentary interruptions of duration one minute or less.

Methodology and Assumptions
Key elements of the methodology:

1. A Business Objects report (*AER RIN 2016 – 17 Sustained Interruption to Supply V1.0*) is extracted from the reporting environment (on 10/07/2017) for the 2017 regulatory year. The report contains the following key information (Events are classified as "excluded" in accordance with Clause 3.3 of the STPIS which aligns with the definitions in the Instructions and Definitions):

   a. An unplanned event list that details the CI, CMI and whole of network SAIDI / SAIFI contribution for each event

   b. An excluded event list that details the CI, CMI and whole of network SAIDI / SAIFI contribution for each event (The exclusion reason of each event is verified against STPIS clause 3.3 (a))

2. The table below details the calculation of each of the variables in Table 3.6.1.1 (Inclusive of MEDs):

Variable_Code	Variable	Calculation
DQS0101	Whole of network unplanned SAIDI	For the regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) 2. Calculate the sum of whole of network SAIDI for excluded events (**b**) 3. Calculate the sum of steps 1 and 2
DQS0102	Whole of network unplanned SAIDI excluding excluded outages	For the regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**)
DQS0103	Whole of network unplanned SAIFI	For the regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**) 2. Calculate the sum of whole of network SAIFI for excluded events (**b**) 3. Calculate the sum of steps 1 and 2
DQS0104	Whole of network unplanned SAIFI excluding excluded outages	For the regulatory year: 1. Calculate the sum of whole of network

		SAIFI for unplanned events (**a**)

3. Calculate the daily unplanned whole of network SAIDI for each day in the 2017 regulatory year.
4. In order to calculate the variables in Table 3.6.1.2 it is first necessary to calculate the 2017 T_{MED}. The T_{MED} is calculated for 2017 in accordance with Appendix D of the STPIS. Data as provided in the Reset RIN in April 2014 for 2011/12 & 2012/13 and for 2013/14, 2014/15 & 2015/16 from Business Objects report 02_01 Monthly and Daily Reporting – Global Ver 15.3 (report run on 10 July 2017), from step 3 above and additional data from Major Event day data to calculate the 2017 Major Event Day Threshold (T_{MED}) is used in the calculation.
5. Flag all events that occur on a day where the daily SAIDI from step 3 is greater than the T_{MED} calculated in step 4 (MED).
6. The table below details the calculation of each of the variables in Table 3.6.1.2 (Exclusive of MEDs):

Variable_Code	**Variable**	**Calculation**
DQS0105	Whole of network unplanned SAIDI	For the regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5) 2. Calculate the sum of whole of network SAIDI for excluded events (**b**) (Excluding events occurring on a day flagged as a MED in step 5) 3. Calculate the sum of steps 1 and 2
DQS0106	Whole of network unplanned SAIDI excluding excluded outages	For the regulatory year: 1. Calculate the sum of whole of network SAIDI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5)
DQS0107	Whole of network unplanned SAIFI	For the regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5) 2. Calculate the sum of whole of network SAIFI for excluded events (**b**) (Excluding events occurring on a day flagged as a MED in step 5) 3. Calculate the sum of steps 1 and 2
DQS0108	Whole of network unplanned SAIFI excluding excluded outages	For the regulatory year: 1. Calculate the sum of whole of network SAIFI for unplanned events (**a**) (Excluding events occurring on a day flagged as a MED in step 5)

Key assumptions used in the methodology:

1. All outage event attributes are correctly entered in OMS.
2. The NMI connectivity details in GIS are correct at the time of outages, or that any errors are managed through manual processes to determine the actual customers affected by an event, or by holding out outage event records in the OUTAGES_NOT_IN_OMS table until GIS updates are received.
3. Ausgrid calculates reliability metrics differently from Appendix A of the STPIS due to technical constraints. Reliability metrics are calculated as follows:

   STPIS Appendix A, Note 1: All reliability metrics are calculated using daily customer counts. Ausgrid has consistently adopted this approach because average customer counts do not result in stable metrics suitable for trend analysis due to the constant adding, removing and reconfiguring of feeders. (Different)

   STPIS Appendix A, Note 2: All unmetered supplies are excluded from the calculation of reliability metrics. (Compliant)

   STPIS Appendix A, Note 3: All active customers are included in the calculation of reliability metrics. All inactive customers are excluded in the calculation of reliability metrics. The following assumptions regarding customer counting have been made:

   Active = Energised + De-energised

   Inactive = Extinct = Deactivated

   De-energised $_{(AER)}$ = Temporary disconnection $_{(AUSGRID)}$

   Inactive $_{(AER)}$ = Permanent disconnection $_{(AUSGRID)}$

   (Compliant)
4. All customers connected to a three phase low voltage supply are interrupted for the entire duration of an event. This approach is adopted because the accurate determination of customers connected to each phase of a low voltage supply is currently not possible.
5. The reliability metrics reported in this worksheet differ from previous metrics provided to the AER for the following reasons:
   - The 2017 T_{MED} has been applied to 2017 regulatory year in Table 3.6.1.2 as per the requirements of this notice.

Use of estimated information

Nil.

3.6.2 Energy not supplied

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

Data used to complete Table 3.6.2 has been taken from outage event records located in Ausgrid's Outage Management System (OMS) and the related reporting extracts and reference tables. See section 3.6.1 for further information about the OMS system.

All other data separation required for this notice (i.e. reporting category) is determined from the attributes of each OMS outage event record.

Ausgrid installs meters on our network to measure consumption. Each meter is assigned a Network Meter Identifier (NMI). For reporting purposes, each NMI is considered as a customer. Ausgrid uses the Business Warehouse Billing Data system to obtain annual consumption data for each NMI for the prior year measured in kilowatt-hours (kWh). This system also provides the total days connected for each NMI. Data from the prior year is used as the current reporting year data is not yet available in full due to the quarterly billing cycle of small customers.

Planned outages are entered into DAROS for the Sydney Control Room and LID for the Newcastle Control Room.

Methodology and Assumptions

Key elements of the Methodology

1. A Business Objects report (planned outage.wid.xlsx) is extracted from the reporting environment for the 2016 regulatory year for each of the regions North, South and nil (nil means there is no region assigned to the NMI because the NMI is for a high voltage customer). Each report contains the following key information (Events are classified as “excluded” in accordance with Clause 3.3 of the STPIS – which aligns with the Instructions and Definitions):
   a. Whole of region **unplanned** customer duration by NMI excluding excluded interruptions for the regulatory year (Including MEDs)
   b. Accompanying data for each NMI instance that details the region, event time, outage job number and reporting category (planned, unplanned, momentary, excluded).
2. A Business Objects report (unplanned regional outages.wid.xlsx) is extracted from the reporting environment for the 2016 regulatory year for each of the regions North, South and nil (nil means there is no region assigned to the NMI because the NMI is for a high voltage customer). Each report contains the following key information (Events are classified as “excluded” in accordance with Clause 3.3 of the STPIS – which aligns with the Instructions and Definitions):
   c. Whole of region **planned** customer duration by NMI for the regulatory year
   d. Accompanying data for each NMI instance that details the region, event time, outage job number and reporting category (planned, unplanned, momentary, excluded).
3. For any outage event a set of NMIs will be affected. A single NMI can be affected multiple times in any one year due to unique outage events and as such the Business Objects reports include multiple entries for some NMIs. For each set of planned or unplanned data for each region and regulatory year, the NMI data is consolidated by summing all the unique outage events and their duration for each NMI. The result is a data set of all NMIs and their total time not supplied for the regulatory year by region.
4. The full set of NMI data for the prior financial year is consolidated into one spreadsheet with the following columns:
   e. NMI
   f. Total outage duration for the year in minutes
   g. Annual measured consumption (kWh)
   h. Days connected
   i. Minutes connected
   j. Energy Not Supplied.

   This data is provided separately for planned and unplanned data.

5. The table below details the calculation of each of the variables in Table 3.6.2 – Actual Information:

Variable_Code	Variable	Calculation
DQS0201	Energy not supplied (planned)	For each NMI in the planned outage list: 1. Calculate minutes connected per NMI **e.** = **d.** x 24 x 60 2. Calculate Energy not supplied per NMI **f.** = **c.** x. (**b.** / **e.**) 3. Summate column **f.** to calculate the energy not supplied for the year and divide this summation by 1,000,000 to present in GWh
DQS0202	Energy not supplied (unplanned)	For each NMI in the unplanned outage list: 1. Calculate minutes connected per NMI **e.** = **d.** x 24 x 60

		2. Calculate Energy not supplied per NMI **f.** = **c.** x. (**b.** / **e.**) 3. Summate column **f.** to calculate the energy not supplied for the year and divide this summation by 1,000,000 to present in GWh

Use of estimated information

Not Applicable

3.6.3 System losses

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

The data within this table is calculated based on energy data provided in tables 3.4.1, 3.4.1.2 and 3.4.1.3 of the Notice.

Methodology and Assumptions

Ausgrid use the formula provided in the Economic Benchmarking RIN for distribution network service providers – Instructions and Definitions section 7.3

Equation 2 Calculation of system losses

$$system\ losses = \frac{electricity\ imported - electricity\ delivered}{electricity\ imported} \times 100$$

Use of estimated information

The data in this table is based on data from other tables of the Notice that are estimates, therefore data in this table is also estimated.

3.6.4 Capacity utilisation

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

The overall utilisation is calculated from the sum of non-coincident Maximum Demand at the zone substation level divided by the summation of each zone substation's capacity. The zone substation capacity is the lesser of the transformer throughput capacity and the feeder exit capacity, evaluated for each zone substation as follows:

$$Overall\ Utilisation = \frac{\sum_{i=1}^{N} NCMD_i}{\sum_{i=1}^{N} \min(Tx\ throughput_i\ , Fdr\ exit\ capacity_i)}$$

where

$N = number\ of\ zone\ substations$

$NCMD_i = Non\text{-}coincident\ maximum\ demand\ for\ the\ i\text{-}th\ zone\ substation$

$Tx\ throughput_i = Transformer\ throughput\ capacity\ for\ the\ i\text{-}th\ zone\ substation$

$Fdr\ exit\ capacity_i = Feeder\ exit\ capacity\ for\ the\ i\text{-}th\ zone\ substation$

Accordingly, there are three key inputs to the capacity utilisation calculation:

1. Non-Coincident Maximum Demand

   This value is sourced from RIN table section 3.4.3.3 - Annual system maximum demand characteristics at the zone substation level - DOPSD0201 - Non-coincident summated raw system annual maximum demand.

2. Zone Throughput Capacity

   Ausgrid's SAP based asset management system contains details on substation assets, such as transformers, circuit breakers, current transformers, etc. Along with the lifecycle status and functional location of these assets, they contain stored characteristics which include information relating to the asset thermal rating. This data is used by an Ausgrid IT system known as the Ratings and Impedance Calculator (RIC) to perform ratings calculations based on ratings rules. RIC generates a report known as "R01 – Present Zone and STS Firm Ratings". This report is used as the base data for the zone substation transformer thermal capacity calculation for each year.

   The RIC system was introduced 4 years ago. Prior to 2011 similar reports known as TF45 were available from a mainframe application known as TIS. The substation capacity information used to calculate capacity is sourced from archived R01 and TF45 reports dating back to 2006.

3. Zone Feeder Exit Capacity

   The exit capacity was determined by summating the ratings of all outgoing 11kV feeders at each zone substation (i.e. capacity those feeders supplying load or providing a back-up supply and including those supplying high-voltage customers). Accordingly, spare panels, and panels supplying auxiliary supplies, capacitor banks or load control equipment, were excluded. Generally the feeder panel rating is used; however, a lower rating may be substituted where a downstream element is known to be limiting the load that can be supplied on a feeder.

   Figures were checked against previous years and any step changes were investigated and confirmed taking into account network alterations implemented during the previous year.

Methodology and Assumptions

Capacity utilisation (DQS04) is a measure of the capacity of zone substation transformers that is utilised each year across the entire Ausgrid network.

DQS04 is calculated from the sum of non-coincident Maximum Demand at the zone substation level divided by the summation of each zone substation's capacity. The zone substation capacity is the lesser of the transformer throughput capacity and the feeder exit capacity, evaluated for each zone substation.

For ease of data collection and in order to avoid splitting summer or winter seasons over two different years an adjusted review period was used. In the case of 2015, the year review period starts on 1 May 2014 and continues through to 30 April 2015.

Zone substations are included in the calculations for a particular year if they have been commissioned before or during the yearly review period and have not yet been decommissioned. Decommissioned zones are not removed from calculations in the yearly review period in which the zone was decommissioned but are removed from the following year.

In the event that there was only one of the capacity values (throughput or exit) available for a particular zone for a particular yearly review period then the known value was used as default.

Specific Data Collection Methodologies:

1. Non-Coincident Maximum Demand

   Ausgrid uses the formula and methodology provided in the Economic Benchmarking RIN for distribution network service providers – Instructions and Definitions Section 5.3.

   This measure is calculated by taking the arithmetic sum of the raw unadjusted (i.e. not weather normalised) maximum demand for each zone substation, irrespective of when it occurred. This maximum demand is not adjusted for embedded generation.

2. Zone Throughput Capacity

   For the purpose of this measure, thermal capacity is the rated continuous load capacity of the zone substation (with forced cooling or other capacity improving factors included if relevant). Ausgrid has assumed through the inclusion of the "capacity improving factors" wording in the above statement that the AER is interested in the normal cyclic rating of the transformer, as opposed to the transformer nameplate rating.

The normal cyclic rating is based on the individual transformer thermal performance from temperature rise tests and the transformers load cycle which will generally not be continuous (constant load), however once the typical load cycle has been allocated to the transformer the normal cyclic rating is available every day of the year, but not every hour of the day.

Ausgrid does not use nameplate ratings for operational or planning purpose. Ausgrid zone transformers have a summer normal rating, summer maintenance rating, summer emergency rating, winter normal rating, winter maintenance rating and a winter emergency rating. These are all cyclic ratings.

Ausgrid has assumed that the AER is actually interested in the transformer throughput rating which considers the rateable equipment such as circuit breakers and other equipment that is in series with the transformer and limits its load carrying capability. Ausgrid has therefore capped the transformer ratings to the applicable throughput rating.

Where a substation has a missing zone throughput capacity data for 2015, the available capacity value from the previous year was used.

3. Zone Feeder Exit Capacity

Sydney Data – the total zone substation distribution feeder exit capacity was based on the summation of the trunk section ratings of the feeders that supply network load connected to a zone substation. Due to the data availability and quantity of zones to check, efforts were put into the validation of feeders where it was known that the exit capacity was the limitation not the Zone transformer throughputs.

The following was taken into account in providing for the simulation:

- Trunk section limitation was based on the minimum rating to the first tee-off of load on the feeder.
- All feeders were limited to 400A to match switchgear/protection systems.
- Thermal ratings are cyclic ratings based on cable type, load cycle, thermal resistivity, mutual heating, OH construction operating temperature.
- Where a substation has missing feeder exit capacity data for 2015, data was sourced from the current system diagram.
- Conversion from 11kV amps to MVA used the following formula based on nominal voltages: $\mathrm{MVA} = \sqrt{3} \text{ x } 0.011 \text{ x } \mathrm{AMPS}_{11\mathrm{kV}}$
- Conversion from 5kV amps to MVA used the following formula based on nominal voltages: $\mathrm{MVA} = \sqrt{3} \text{ x } 0.005 \text{ x } \mathrm{AMPS}_{5\mathrm{kV}}$
- Where possible, double banked feeders were captured as 2 feeders.
- Feeders that were normally open at the circuit breaker and connected to feeders supplying the network were included.
- Network models for each year were created based on archived connectivity data as at the end of December of each calendar year. It was assumed that the December model snapshot represented that summer's configuration and the previous winter's configuration.
- Ausgrid owned feeders that exited the zone substation were only summated. Feeders that did not exit the zone such as ones supplying only FIU, Aux subs, capacitor banks, or inter group ties were excluded.
- Where HV customers own the cables connected to our substations, they have been excluded such as Graving Dock, ANSTO, CALTEX etc.

Hunter Data – the total zone substation distribution feeder exit capacity was based on the summation of the trunk section ratings of the feeders that supply network load connected to a zone substation.

The following was taken into account when running the simulation:

- Feeders are included if they normally supply load or could be used to supply load.
- The trunk ratings of 11kV feeders for the Hunter area are based on the section of feeder that carries 90% or more of the total feeder load.
- The trunk ratings for the Hunter are recorded on a yearly basis in an 11kV feeder forecast which exists to 2004.
- Where ratings were unavailable for a certain year the ratings from the previous year and subsequent year were used.
- Throughout the period many new zones were commissioned with several commissioned in stages. As a zone is commissioned in stages the zone exit capacity changes on a regular basis as new 11kV feeders are connected.

Use of estimated information

The data in this table is based on:

- The Annual system maximum demand at the zone substation level - DOPSD0201 which is being provided as actual information;
- The zone substation feeder exit capacity which is based on feeder ratings that are obtained from actual data; and
- Zone substation transformer throughput ratings are based on actual ratings obtained from Ausgrid's business systems.

Accordingly, the data in this table has been provided as actual information.

Worksheet 3.7 – Operating environment factors

3.7.1 Density factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

Customer Density

Customer numbers were used from Table 3.4.2. See related basis of preparation section.

Route Line length utilised the Route Line Lengths calculated in DOEF0301. Basis of preparation 3.7.2 defines the source of this information.

Energy Density

Energy density information was sourced from Tables 3.4.1.1 (for energy) and 3.4.2.1 (for customer numbers).

Demand Density

Refer Tables 3.4.3.3 - DOPSD0201 (for demand) and 3.4.2.1 - DOPCN01 (for total customer numbers).

Methodology and Assumptions

Customer Density is a direct calculation from the results of DOEF0301 and Customer numbers in Table 3.4.2 (Number of customers divided by Route km) therefore all assumptions defined for this data are applicable to Customer Density.

The Energy Density is the energy delivered from Table 3.4.1.1 divided by the customer numbers from Table 3.4.2.1.

The Demand Density is the total kVA non-coincident demand data (summed at zone substation level) from Table 3.4.3.3 divided by the total customer numbers from Table 3.4.2.1 of the benchmarking RIN.

Use of estimated information

There is no estimated information.

3.7.2 Terrain factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

DOEF0205 Total 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 to provide the information consistent with "Economic benchmarking RIN Instructions and Definitions", this has been defined in Methodology and Assumptions.

The constructed span data was used to calculate;

- DOEF0204 Total Vegetation Maintenance Spans
- DOEF0202 Urban and CBD Vegetation Maintenance Spans
  - Combined with 2016 reliability feeder classifications.
- DOEF0203 Rural Vegetation Maintenance Spans
  - Combined with 2016 reliability feeder classifications.
- DOEF0201 Rural Proportion
  - Combined with 2016 reliability feeder classifications.

- DOEF0212 Tropical Proportion
  - Combined with Bureau of Meteorology Climate Classification Maps based on standard 30 year climatology (1961 -1990).
- DOEF0213 Standard Vehicle Access
  - Combined with current (July 2016) road corridor data from the Land and Property Information.
- DOEF0214 Bushfire Risk
  - Combined with Rural Fire Service 2017 Bushfire Prone Land data.
- DOEF0210 Average Number of Defects per Urban and CBD Vegetation Maintenance Span
  - Combined with 2016 reliability feeder classifications,
  - Ausgrid acquired 2016 Light Detection And Ranging (LiDAR) vegetation defect data.
- DOEF0211 Average Number of Defects per Rural Vegetation Maintenance Span
  - Combined with 2016 reliability feeder classifications,
  - Ausgrid acquired 2016 LiDAR vegetation defect data.
- DOEF0208 Average Number of trees per Urban and CBD Vegetation Maintenance Span
  - Combined with 2016 reliability feeder classifications,
  - Ausgrid acquired 2012, 2014, 2015 and 2016 LiDAR vegetation data.
- DOEF0209 Average Number of trees per Rural Vegetation Maintenance Span
  - Combined with 2016 reliability feeder classifications,
  - Ausgrid acquired 2012, 2014, 2015 and 2016 LiDAR vegetation data.
- DOEF0206 and DOEF0207
  - Was obtained from the Contract Operations group in Ausgrid and is based on the typical network maintenance cycle.

Methodology and Assumptions

<u>Span Calculation and Feeder Classification</u>

Ausgrid assessed the Australian Energy Regulator's (AER) recommendation to use number of poles minus one to calculate the number of spans. Further analysis found this methodology to be fundamentally flawed where the overhead network was not linear in nature. For example if the spans created a closed loop the number of spans equals the number of poles, however if the spans formed a grid (adjoining loops sharing a span) the number of poles has no relationship on the number of spans.

In Figure 3.7.2.1 (below) the numbers represent the count of spans, black lines represent actual network span data in an area west of Sydney, and black circles represent poles.

For simplicity poles in-between main vertices and the small line segments teeing off the main line have been ignored. This has no impact on the formula or result.

- Red numbered spans (1-5) – this is a simple loop (common in residential areas which are not densely populated).
  - The span count equals the number of poles. (20% error using pole count minus one)
- Combining the red and blue numbered spans (1-8) – this is the simplest form of a grid (common in residential areas which are not densely populated).
  - The span count equals the number of poles plus one. (33% error using pole count minus one)
- Combining the red, blue, and green numbered spans (1-11) – this is a larger grid (common in residential areas).
  - The span count equals the number of poles plus two. (22% error using pole count minus one)

- Combining red, blue, green, and orange numbered spans (1-21) – this forms a grid consisting of multiple rows and columns (this is the most common span configuration throughout residential, urban, and CBD areas).
    - o The span count equals the number of poles plus five. (31% error using pole count minus one)

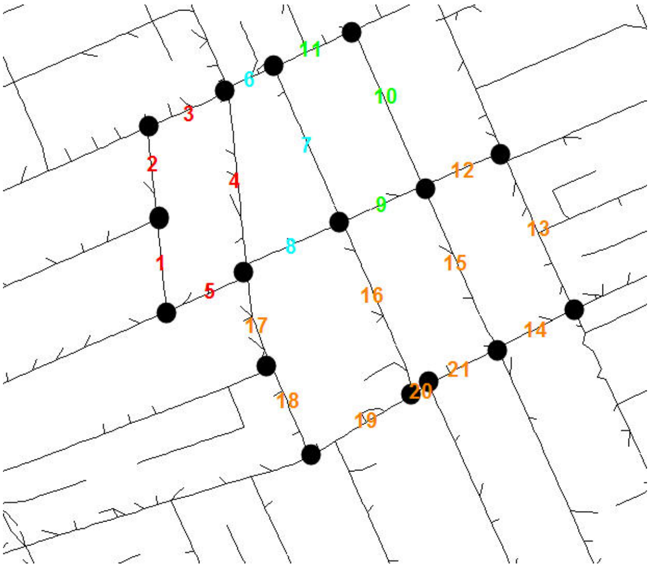

Figure 3.7.2.1

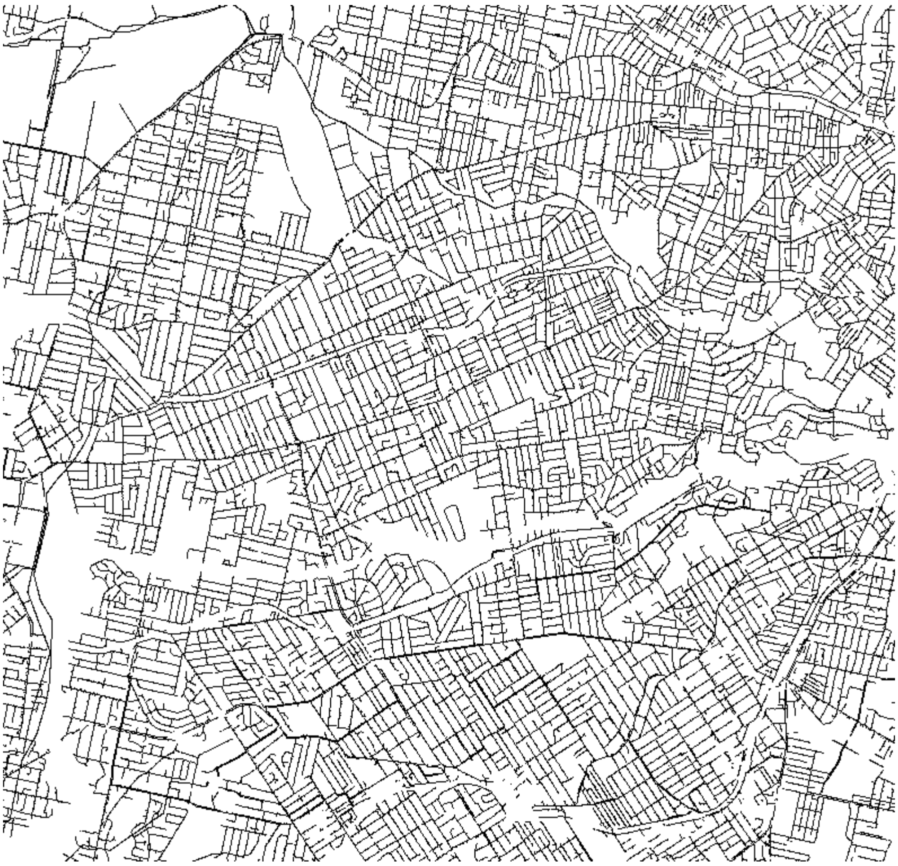

Figure 3.7.2.2 - a larger sample area showing that these areas are not insignificant.

Additionally, an overhead service from Ausgrid's network to the first point of attachment is known as "Service Mains", is considered part of Ausgrid's network and may or may not be between poles, therefore increasing the error in the AER's pole minus one methodology.

Ausgrid calculated the number of spans for 2016/17 to be 1,195,740 but only consists of 510,284 poles.

These errors are exacerbated further when calculating the number of spans with bushfire risk. The individual, scattered polygons recorded in the Rural Fire Services bushfire prone land dataset results in cases where the spans cross at risk areas, but the poles at either end of the span fall outside. Using the AER's suggested methodology, results in this span not being counted in bushfire prone land.

The span connected to Ausgrid's network where it is connected to the point of attachment, or the first span to a private pole is known as "Service Mains" and is considered part of Ausgrid's network therefore it has been counted as one span. The LiDAR data used to calculate average number of trees and defects did not cover service lines or their related defects. For this reason, services have been excluded in these calculations for DOEF0208, DOEF0209, DOEF0210, and DOEF0211, otherwise it would result in an inaccurate result.

To calculate the number of spans Ausgrid spatially manipulated the data using the following methodology:

- The circuit data was split into individual line segments at every pole.
- Where the line segments ran parallel to each other they were snapped together.
- For spans which contained multiple conductors with different feeder classifications (Rural portion, Urban, and CBD), the highest voltage's classification was attributed to the span, with all other line segments ignored. If the span represented conductors with different feeder classifications and of the same voltage the following hierarchy was applied to the span:

  1. CBD

  2. Urban

  3. Rural.
- The AER has requested the span data be provided by feeder classification, however Transmission feeders (feeders > 22kV) and Street Light circuits 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. 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.
- The RIN templates only show spans associated with low voltage and high voltage mains. Transmission only and Street Light only spans were not included in the RIN Template. The template could not be modified to include these spans so the results have been provided below;

  Transmission only spans (17,153) and Street Light only spans (21,877) are included in "total number of maintenance spans" (DOEF0204), and "total number of spans" (DOEF0205).

<u>Average Number of Trees and Defects</u>

The AER Instructions and Definitions for the Economic Benchmarking RIN outlined a number of data sources that Ausgrid was required to use to underpin estimates, including using Normalised Difference Vegetation Index (NDVI) grids and maps available from the Bureau of Meteorology, or data from the National Vegetation Information System (NVIS) overlaid with GIS data to calculate the average number of trees per span.

The Bureau of Meteorology provides the following description of the NDVI[4]:

> *"The NDVI is calculated from the red and near-infrared reflectances rRed and rNIR. Its value is always between -1 and +1. Vegetation NDVI in Australia typically ranges from 0.1 up to 0.7, with higher values associated with greater density and greenness of the plant canopy. NDVI decreases as leaves come under water stress, become diseased or die. Bare soil and snow values are close to zero, while water bodies have negative values."*

NVIS is orientated towards native vegetation and NVIS data was partially updated in NSW with 2001-09 data, with extensive areas of 1997 data remaining from the earlier version of NVIS.

[4] For more information, see http://www.bom.gov.au/climate/austmaps/about-ndvi-maps.shtml

Both of these data sources do not contain any spatial or a-spatial data regarding vegetation density or number of trees, they consist of vegetation health and native species data. Additionally, both are represented at a resolution which far exceeds the area covered by vegetation management activities to comply with Ausgrid's vegetation obligations.

Ausgrid utilised LiDAR acquired data for 2013, 2014, 2015 and 2016 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 onwards from 2015 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.

The source data did not fully cover the Ausgrid's network, nor was it an equal sample of construction types, environmental, and demographic variations within its supply area. The coverage area for LiDAR acquisition has been modified each year to obtain a greater coverage over the network area. This results in a difference in sample data used year on year between 2012 and 2016 shown in the table 3.7.2.3 below;

Sample Data Representation of Total Network

Feeder Classification	2012	2013	2014	2015	2016
Transmission	66%	63%	65%	45%	69%
Rural	34%	94%	53%	58%	76%
Urban/CBD	1%	10%	18%	14%	23%

Table 3.7.2.3 *- Sample Data Representation of Total Network*

To increase the sample data for the 2016 average number of trees and therefore reporting accuracy; data coverage from the 2016 LiDAR acquisition has been combined with the 2015 LiDAR areas omitted from the 2016 flights. Data coverage from 2012, 2013 and 2014 LiDAR acquisition was included where it has been omitted from both 2015 and 2016 LiDAR acquisition areas. Note that this was not used to calculate the average number of defects; average number of defects only used the 2016 LiDAR data.

The network covered by summing the 2013 2014, 2015 and 2016 LiDAR coverage areas together is shown below in table 3.7.2.4

Sample Data Representation of Total Network

Feeder Classification	2012	2013	2014	2015	2016	Total LiDAR Coverage
Transmission	66%	63%	65%	45%	69%	85%
Rural	34%	94%	53%	58%	76%	91%
Urban/CBD	1%	10%	18%	14%	23%	38%

Table 3.7.2.4 *- 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 for 2017;

- The average number of trees per Transmission span equals 3.165
- The average number of defects per Transmission span equals 1.424.

An increase in number of defects per span in 2015 is due to the manner in which vegetation encroachments are collected and classified. The defect classification for 2015 factors in the span length and voltage to determine clearance requirements and therefore defect. Technology, LiDAR sensor and processing improvements have enabled more detailed data acquisition. This detail means a single defect in 2014 may have been represented by a larger contiguous area, whereas with the improvements individual canopies and encroachment defects are identified. Additionally, following vegetation trimming and clearance, regrowth will result in a greater number of smaller individual canopies which are detected as individual defects. In total, due to the above improvements the number of defects has increased but the area of vegetation causing the defect has decreased. In 2014, the total area for vegetation defects was 17,469,898.20 m^2 whereas in 2015 the total area was 8,133,267.48 m^2 (a reduction of approximately 53%). Figure 3.7.2.5 (below) shows an example where a large contiguous area of defect vegetation (n = 1) has been cleared but regrowth has been detected as a number of smaller defect areas (n = 9).

***Table 3.7.2.5** – Representation of defect vegetation areas. Red outline shows a single contiguous in 2014 (n = 1), but subsequently in 2015 the defects have reduced in size but are separate areas (n = 9).*

Vegetation Maintenance Spans

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 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.

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" (DOEF0202) and "Rural" (DOEF0203) number of maintenance spans will not equal the "total number of maintenance spans" (DOEF0204). Transmission only spans (17, 153) and street light only spans (21.877) are included in "total number of maintenance spans" (DOEF0204), and "total number of spans" (DOEF0205).

Tropical Proportion

Service lines have been excluded.

Standard Vehicle Access

It was assumed that Standard Vehicle Access DOEF0213 is length of spans not accessed by a standard vehicle as defined in the definition.

Standard Vehicle Access is defined by the AER in the RIN Instructions and Definitions (page 50) as:

> *"Distribution route Line Length that does not have Standard Vehicle Access. Areas with Standard Vehicle Access are serviced through main roads, gravel roads and open paddocks (including gated and*

fenced paddocks). An area with no standard Vehicle Access would not be accessible by a two wheel drive vehicle."

Ausgrid does not record information with regard to length of network accessible in relation to vehicular capability or terrain.

The estimated values for Standard Vehicle Access have been calculated as follows: Spans which are not within a 10m buffer of a designated road corridor formed or unformed were identified using GIS spatial analytical software. The spans output of this query were then removed if the continuous line segment length was less than 100m, thus removing small segments which in most cases run parallel with the road corridor (assumed to be also accessible via a standard vehicle).

Service Mains[5] have been excluded because (length is not measured) Ausgrid applies an arbitrary length of 10m towards the centre of the supplied land parcel. Actual lengths could extend much further than 10m and Ausgrid has no way of determining this length. Using an arbitrary length would compromise the validity of the actual route length calculated. The total number of service mains consists of 720,139 spans (an extra 7,201 km of mains if an arbitrary length of 10m per service was used) in total.

The decrease in length over the last year from 7,098.92km in 2015/16 to 6,197.44km in 2016/17 is due to a refinement in the calculations of the standard vehicle access.

Underground network has been excluded from this calculation.

Note: because underground is included in the route line length;

> "Standard Vehicle Access" divided by the "Route Line length" is not an accurate measure of "proportion of network not accessible via a standard vehicle".

Bushfire Risk

Includes Service Mains[5] where they are subject to vegetation management.

Rural proportion

Services Mains[5] lengths are an arbitrary length of 10m towards the centre of the supplied land parcel, therefore they have been excluded.

Underground cables are excluded for calculating the Route length classified as short or long rural in km, and the Total network Line. Therefore the figures reporting the Rural proportion excludes underground network cables.

Average Vegetation Management Cycles

Ausgrid ensures vegetation management activities are executed under a contract arrangement whereby the contractor is required to maintain clearances throughout the term of the contract.

The frequency in which the contractor carries out activities to fulfil their responsibilities is not known by Ausgrid and would vary depending on the vegetation type, area, and contractor.

There is no clause or requirement in the contract to carry out vegetation maintenance activities in a cyclic manner. However, the typical maintenance review cycle is 1 year.

Use of estimated information

- DOEF0213 - Standard vehicle access

  Ausgrid does not record information with regard to length of network accessible in relation to vehicular capability or terrain.

  The estimated values for Standard Vehicle Access have been calculated as follows: Spans which are not within a 10m buffer of a designated road corridor formed or unformed were identified using GIS spatial analytical software. The spans output of this query were then removed if the continuous line segment length was less than 100m, thus removing small segments which in most cases run parallel with the road corridor (assumed to be also accessible via a standard vehicle).

- DOEF0206 - Average urban and CBD vegetation maintenance span cycle, and

- DOEF0207 – Average rural vegetation maintenance span cycle

  There is no clause or requirement in the contract to carry out vegetation maintenance activities in a cyclic manner. However, the typical maintenance review cycle is 1 year.

[5] *The low voltage overhead mains belonging to the company between the company's Distribution Mains and the Point of Supply*

3.7.3 Service area factors

Compliance with requirements of the notice

The information provided is consistent with the requirements of this Notice.

Source of information

DOEF0301 Route Line Length 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 to provide the information consistent with "Economic benchmarking RIN Instructions and Definitions", this has been defined in Methodology and Assumptions.

Methodology and Assumptions

In this section we explain the methodology Ausgrid applied to provide the required information, including any assumptions Ausgrid made.

To calculate the route line length Ausgrid spatially manipulated the data using the following methodology;

- The circuit data was split into individual line segments at every pole.
- Where the line segments ran parallel to each other they were snapped together.
- For spans which contained multiple conductors duplicates were removed and the length calculated.

Services Mains[6] lengths are an arbitrary length of 10m towards the centre of the supplied land parcel, therefore they have been excluded. The total number of service mains consists of 720,139overhead services and approximately 230,808 underground services (an extra 9,527km of mains if an arbitrary length of 10m per service was used).

The definition of Route Line Length (DOEF0301) as defined by the AER to include underground cables has been accommodated.

> "*This email concerns the "Route Line Length" variable (DOEF0301)*
> *We have received a question as to whether Route Line Length captures the length of underground cables. We confirm that the intention of this variable is to capture the length of both underground cables and overhead lines. However we note that the wording of the definition in the economic benchmarking RIN isn't clear regarding this.*
> *We request that you include the route length of underground cables in route line length. This will ensure that this measure is consistent across NSPs and will appropriately account for the route length of all conductors should this be used as a benchmarking metric."*
> (email from the AER titled "EBT RIN – Route Line Length" on 07/04/2014 at 02:50pm)

The original definition of Route Line Length to be "measured as the length of each span between poles and/or towers" is not relevant to underground cables; therefore length for each underground conductor circuit was added to the overhead route line length which was calculated in accordance with the original definition. That is for overhead lines; "each span is considered only once irrespective of how many circuits it contains".

Use of estimated information

There is no estimated information.

[6] *The low voltage overhead mains belonging to the company between the company's Distribution Mains and the Point of Supply*