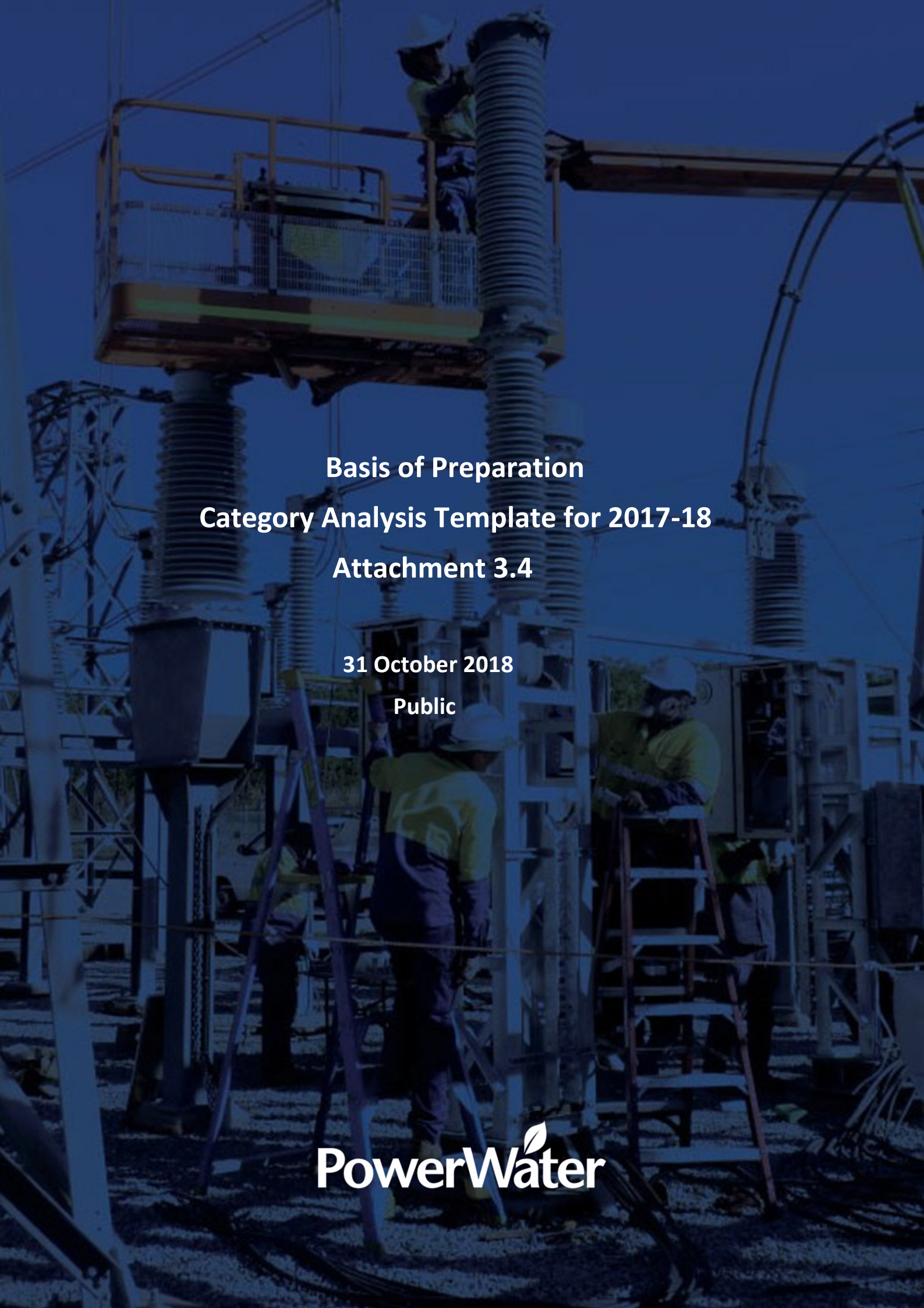

Basis of Preparation
Category Analysis Template for 2017-18
Attachment 3.4

31 October 2018

Public

PowerWater

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Overview

On 17 August 2018, the Australian Energy Regulator (AER) issued Power Water Corporation (Power and Water) with a Regulatory Information Notice (RIN) on category analysis for 2017-18. The RIN requires we prepare a basis of preparation addressing the templates in the Microsoft Excel workbooks. We have prepared the response based on the order of templates.

We have also provided appendices for detailed information referred to in multiple templates. The appendices are the capex methodology (Appendix A), repairs and maintenance methodology (Appendix B), Operating expenditure methodology (Appendix C) and Vegetation Maps (Appendix D).

We have structured our basis of preparation to reflect the order of templates in the AER's Microsoft Excel workbooks. We have explained:

- The source of the information.
- Whether the information provided is actual and estimate based on the AER definitions, and if an estimate how it is the best method.
- How we have complied with the RIN requirements.
- The methodology and assumptions we used to calculate the information.
- Whether the information contains confidential information.
- How we have complied with the RIN requirements.

We expect that the AER will publish the final form of the basis of preparation and the associated data template with our information. The information was collected and provided in good faith and was based on every effort to comply with the requirements of the RIN. In doing so, we have had to estimate some data because we did not have the capability to report the information specified by the RIN. As the data is estimated, we recommend caution in using the data for benchmarking or other analysis.

We developed our best estimate in good faith, with the objective of providing the most accurate data given the RIN requirements. For all estimated information, the RIN requires we provide reasons for why we consider the estimate to be our best estimate. In our circumstances our estimate was 'best' because:

- We were only able to develop a single method for the majority of estimated information.
- The estimated information was prepared and reviewed by subject matter experts.

In all instances where we have provided estimated rather than actual information, we assessed available alternatives to determine the most appropriate estimation technique. All estimated information included in the RIN are our best estimates and we have explained how the estimate has been calculated in the relevant section of the Basis of Preparation.

Template 2.1 - Expenditure Summary and Reconciliation

Table 2.1.1 - Standard control services capex

Table 2.1.2 - Standard control services opex

Table 2.1.8 - Standard control services capitalised overheads

Source of Data

For SCS capex, the source of the information is as follows:

- For replacement, connections, augmentations, and non-network expenditure, the source of information is Maximo, FMS, and TM1. Information from these sources were used in the capex methodology as described in Appendix A of this Basis of Preparation.
- For both capitalised network and corporate overheads, the source of information is from the capex methodology and the audited statutory accounts.

For SCS opex, the source of the information is as follows:

- For vegetation management, maintenance, and emergency response expenditure, the source of information is Maximo.
- For non-network expenditure, network overheads, and corporate overheads, the source of information is the audited statutory accounts.

Public lighting data has not been provided as the Framework and Approach Paper (F&A) did not classify public lighting to be either standard control or alternative control services.

Estimated or actual information

The information is actual. All information reported in template 2.1 has been based on our financial system, audited statutory accounts, fixed asset register, asset management system or other systems. We have performed calculations and allocations to derive all amounts. If we had used a different method it would not result in materially different outcomes. Therefore, the RIN defines this information to be actual information.

Methodology and assumptions

Standard control services capital expenditure (Table 2.1.1)

The replacement, connections, augmentation and non-network capex were calculated using the capex methodology outlined in Appendix A. In summary, all work orders and projects were assigned a single service classification (i.e. standard control services) and a RIN expenditure category. We reported these variables as the sum of the expenditure for work orders and projects where the assigned services classification was standard control services and the expenditure category was replacement, connections, augmentation or non-network respectively.

We reported the cost of our Long Service Leave Levy as a capitalised overhead expenditure. Our expenditure on this levy is a cost we must incur when we work on construction projects and is

therefore capitalised. We allocated this amount to standard control services on a percentage basis. This amount was sourced from Maximo.

The other component of the capitalised overheads expenditure variable for 2017-18 was based on our audited statutory accounts. The methodology we used to calculate the overhead expenditure and how much was capitalised is explained in Appendix C. Overheads are discussed in more detail in this basis of preparation in our response to template 2.6.

The metering variable has been reported with zero values as we do not have any standard control expenditure associated with metering services, as metering services are classified in the Framework and Approach paper as alternative control services.

The public lighting variable has been reported with zero values because the Framework and Approach paper (F&A) did not classify public lighting to be either standard control or alternative control services. It should be noted that on 1 January 2018, we transferred the responsibility for public lighting services in the Northern Territory to local councils.

The balancing item variable is comprised of accounting adjustments and small variances between the audited statutory accounts and Maximo. The accounting adjustments in the balancing item relate to manual journals used to make corrections to the financial accounts. For example, the accounting adjustments included journals to reverse accruals, to cancel project expenditure and to move expenditure to the correct project. The differences are immaterial and treated as a balancing item to ensure the RIN figures reconcile to the audited statutory accounts.

The capcons variable is the sum of all capital contributions in accordance with the RIN definition. That is, this amount includes all capital contributions revenue received in the form of cash or gifted assets for standard control services. The capital contributions revenue was not added to the other expenditure category totals, however the capital expenditure variables already included the expenditure we incurred to deliver projects that were funded by capital contributions. The capcons variable is explained in this basis of preparation in relation to template 2.1.5.

Standard control services operating expenditure (Table 2.1.2)

The vegetation management, maintenance and emergency response variables were calculated based on work order data from our asset management system (Maximo). We collated the work order data in a Microsoft Excel model, which is fully explained in Appendix B - Repairs and maintenance.

Each work order was assigned to the RIN expenditure categories based on work order descriptions and other work order attributes. The annual amounts for each variable were calculated as the sum of all work order expenditure for each category.

The non-network, network overhead and corporate overhead expenditures were primarily calculated from audited statutory accounts. We allocated each account from our audited statutory accounts to a service classification only if it could be completely attributed to the provision of a single service. Other accounts remained unallocated. Further, every account was attributed to the expenditure categories required by the RIN.

The non-network, corporate overhead and network overhead expenditures were calculated by adding the total expenditure for each account attributed to standard control services and the relevant expenditure category. We apportioned the unallocated accounts to standard control services based on the ratio of the amounts directly attributed to standard control services to the amounts directly attributed to all services.

We also identified that a number of repair and maintenance work orders involved works that were considered to be non-network or network overheads expenditures. We added these to the amounts identified from the audited statutory accounts to derive the total category expenditure.

The metering variable has been reported with zero values as we do not have any standard control expenditure associated with metering services, as metering services are classified in the Framework and Approach paper as alternative control services.

The public lighting variable has been reported with a value of zero because the Framework and Approach Paper (F&A) did not classify public lighting to be either standard control or alternative control services.

The balancing item includes small variances between the expenditure captured in Maximo and the audited statutory accounts. This difference was predominantly due to an error in Maximo, which was assigning an incorrect general ledger account to a small number of transactions. The differences are immaterial and treated as a balancing item to ensure the RIN figures reconcile to the audited statutory accounts.

Standard control services capitalised overheads (Table 2.1.8)

We reported all variables in this table with values of zero. This is because we have reported all overheads in the overheads categories. We have not reported overheads in the expenditure categories listed in this table.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 3.1: PWC must calculate the expenditure for each capex and opex category reported in the Category analysis workbook, regulatory templates 2.2 to 2.10 and 4.2 to 4.4 and report these amounts in the corresponding rows in tables 2.1.1 to 2.1.6.	We calculated the expenditure for each category in templates 2.2 to 2.10 and 4.2 to 4.4 and reported the total of these amounts in the corresponding rows in tables 2.1.1 to 2.1.6. Where we do not provide a particular service, we have reported these amounts with zero values.
Clause 3.2: Subject to paragraph 2.12, and any capital contributions reported, the total expenditure for the capex and opex for each service classification in tables 2.1.1 to 2.1.2 in regulatory template 2.1 must be mutually exclusive and collectively exhaustive. Total	The expenditure we reported in tables 2.1.1 to 2.1.2 is reported on an as incurred basis and is mutually exclusive and collectively exhaustive.

Appendix E Requirements	Consistency with the RIN requirements
expenditure for capex must be reported on an "as-incurred" basis.	
Clause 3.3: Where overhead expenditures are included in non-network expenditures in Category analysis workbook, regulatory template 2.1, tables 2.1.1 or 2.1.2 a balancing item must be reported in tables 2.1.1 and 2.1.2 of regulatory template 2.1.	Our overhead expenditures are not included in non- network expenditures in 2.1.1 or 2.1.2.
Clause 3.4: Total capital contributions must be reported in Category analysis workbook, regulatory template 2.1, table 2.1.1, and disaggregated in table 2.1.7. The total capital contributions in table 2.1.7 must reconcile with that reported in table 2.1.1.	Total capital contributions have been reported in table 2.1.1 and disaggregated in table 2.1.7. The total capital contributions in table 2.1.7 reconcile with that reported in table 2.1.1.
Clause 3.5: Disaggregated capitalised overheads must be reported in Category analysis workbook, regulatory template 2.1, table 2.1.8. The total capitalised overheads in table 2.1.8 must reconcile with overheads reported in table 2.1.1.	We did not report capitalised overheads in the direct expenditure categories (augex, repex) with the exception of alternative control services metering expenditure. These overhead costs were included in the metering variable in table 2.1.3 and 2.1.4. Therefore, we separately reported the metering capitalised overhead expenditure in table 2.1.8 and all other variables are reported as zero expenditure.

Table 2.1.3 - Alternative control services capex

Table 2.1.4 - Alternative control services opex

Reconciliation of capex and opex to audited statutory accounts and regulatory accounts

Source of Data

We sourced the data from our audited statutory accounts and Maximo.

Estimated or actual information

The information in our statutory accounts and Maximo are business records. Therefore, the RIN defines this information as actual information.

Methodology and assumptions

Alternative control services capital expenditure (Table 2.1.3)

The connections, metering, non-network, fee-based services and quoted services capex were calculated using the capex methodology outlined in Appendix A of this Basis of Preparation. In summary, all work orders and projects were assigned a single service classification and a RIN expenditure category. We reported these variables as the sum of the expenditure for work orders and projects where the assigned services classification was alternative control services and the expenditure category was connections, metering, non-network, fee-based services and quoted services, respectively.

For capitalised network overheads and capitalised corporate overheads, we reported the cost of our Long Service Leave Levy as a capitalised overhead expenditure. Our expenditure on this levy is a cost we must incur when we work on construction projects and is therefore capitalised[4]. We allocated this amount to alternative control services on a percentage basis. This amount was sourced from Maximo. The other component of the capitalised overheads expenditure variable, for 2017-18, was based on our audited statutory accounts. The methodology we used to calculate the overhead expenditure and how much was capitalised is explained in Appendix C of this Basis of Preparation. Overheads are discussed in more detail in this basis of preparation in our response to template 2.6.

The public lighting variable has been reported with a value of zero because the Framework and Approach Paper (F&A) did not classify public lighting to be either standard control or alternative control services.

Alternative control services operating expenditure (Table 2.1.4)

The only connections opex we incur in providing alternative control services is the energisation, disconnection and reconnection services reported in Table 4.3. For 2017-18, we have reported the corresponding amounts in Table 2.1.4 as connections.

For metering, fee-based services, quoted services, non-network, network overheads and corporate overheads we primarily calculated these from the audited statutory accounts. We

allocated each account from our audited statutory accounts to a service classification only if it could be completely attributed to the provision of a single service. Other accounts remained unallocated. Also, every account was attributed to the expenditure categories required by the RIN.

The energisation, disconnection and reconnections expenditure reported as connections in Table 2.1.4 have been deducted from the Fee and Quoted Services opex to ensure there is no double counting of opex.

The non-network, corporate overhead and network overhead expenditures were calculated by adding the total expenditure for each account attributed to alternative control services and the relevant expenditure category. We apportioned the unallocated accounts to alternative control services based on the ratio of the amounts directly attributed to standard control services to the amounts directly attributed to all services.

We also identified that a number of repair and maintenance work orders involved works that were considered to be metering, fee-based services, quoted services, non-network and network overheads expenditures. We added these to the amounts identified from the audited statutory accounts to derive the total category expenditure.

The public lighting variable has been reported with a value of zero because the Framework and Approach Paper (F&A) did not classify public lighting to be either standard control or alternative control services.

Reconciliation of capex and opex to audited statutory accounts and regulatory accounts

Reconciliation of capex to audited statutory accounts and regulatory accounts

We provided a reconciliation of the expenditure reported in template 2.1 to the amounts reported in our audited statutory accounts and also to our regulatory accounts. We started the reconciliation with the property, plant and equipment amount reported on the balance sheet as part of our statutory accounts. We then showed the variances to report the movement in property, plant and equipment, which is reported in the regulatory accounts.

Our reconciliation then identifies which amounts that have been excluded from the RIN capex reporting, including interest during construction, capitalisation of work in progress, accruals and other accounting entries. Finally, we show the classifications of the total capex amount we applied to derive the total capex reported in template 2.1.

Reconciliation of opex to audited statutory accounts and regulatory accounts

We provided a reconciliation of the expenditure reported in template 2.1 to the amounts reported in our audited statutory accounts and, also, to our regulatory accounts. We started the reconciliation with the operating expenses reported on the Profit & Loss statement as part of our statutory accounts.

We then showed the variances to report the movement in expenses, which is reported in the regulatory accounts. Our reconciliation then identifies which amounts that have been excluded from the RIN opex reporting, including interest expense, depreciation expense, tax expense and other accounting entries.

Finally, we show the classifications of the total capex amount we applied to derive the total opex reported in template 2.1.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
Clause 3.6: PWC must provide an excel spread sheet that contains the calculation of balancing items reported in the Category analysis Workbook, regulatory template 2.1. At a minimum, this spread sheet must: • for each instance where an expenditure item is reported more than once (i.e. double counted), identify: • where that instance is reflected in expenditure included in the regulatory templates; • the value of that expenditure in each regulatory template.	We have provided a Microsoft Excel Spreadsheet at Attachment 3.7 that shows how the balancing item was calculated. No item has been double counted.
Clause 3.7: PWC must provide a reconciliation between the total capital and operating expenditure provided in the Category analysis Workbook, regulatory template 2.1 to the capital and operating expenditure recorded in PWC's regulatory accounting statements and audited statutory accounts.	We have provided a reconciliation between the total capex and opex reported in template 2.1 and the total capex and opex reported in the audited statutory accounts and the regulatory accounts.

Table 2.1.5 - Dual function assets capex

Table 2.1.6 - Dual function assets opex

Table 2.1.7 - Standard control services capcons

We do not have any dual function assets so we have reported zero values for this table. Our method of evaluating that we had no dual function assets was to assess whether any of our network assets met the definition in the RIN. Our analysis identified that none of our assets met this definition.

Similarly, we reported zero for all variables for standard control services capcons. This is because we have reported all overheads in the overheads categories. We have not reported overheads in the expenditure categories listed in this table.

Template 2.2 - Repex

Table 2.2.1 - Replacement expenditure, volumes and asset failures by asset category

Source of Data

For replacement expenditure, quantities, and asset failures the source of the data was our asset management system (Maximo).

Estimated or actual information

The majority of information is actual. However we note that “other asset failures” is estimated data.

Replacement expenditure and quantities was sourced from our asset management system and our financial system. There was a significant amount of categorisation, mapping allocation and assumptions applied. We applied rules primarily based on our system data and expenditure attributes. If we started again and applied different assumptions it is likely that we would report values that are not materially different. Therefore, the RIN defines this as actual information.

Asset failures in relation to pole-top structures, conductors, cables, service lines, transformers, switchgear and field devices was based on Maximo Event module data and is defined by the RIN to be actual information.

Other asset failures was based on information that was manually mapped and estimated. This information is defined by the RIN as estimated information.

Methodology and assumptions

We calculated our replacement expenditure and volumes using the capex methodology described in appendix A of this Basis of Preparation. In summary, we first identified all capital expenditure projects that were repex projects by default. This included all our renewal/replacement projects excluding any that were known to be customer connections, customer augmentation and expenditure on the NT Build levy for long service leave for NT constructions workers.

There were many instances where our capital projects were not given the correct classifications in our asset management system and there were some projects which involved a combination of replacement and augmentation works. For these exceptions, we manually assigned the correct category for RIN reporting. All repex projects were then further classified into the relevant categories in table 2.2.1 and we made the following assumptions:

- In some cases, we replaced assets in one repex category with assets belonging to another repex category. For example, some 500kVA distribution transformers replaced by 750kVA units. The repex category of the new asset was used to report the expenditure and volumes. We did not apply this assumption when the primary driver of the project was capacity rather than asset condition.

- Where an asset replacement resulted in a new asset in addition to the replacement asset, the new asset was included in the expenditure and quantity tables.

Below we outline the treatment of each repex asset group and outlines where assumptions or estimates have been made.

Primary assets

- Poles - We included distribution poles, transmission poles and towers and we excluded refurbishments, which were reported under the 'other' category.
- Pole-top structures - Includes the replacement of a cross-arm or the replacement of all insulators on a pole-top. Applies to distribution and transmission pole-top structures.
- Staking wooden poles - We do not have wooden poles so we have reported this variable with values of zero.
- Overhead conductors - We included all overhead conductors except for service wires. We treated replacement of pole-top clamps with splices as replacement of 1m of conductor.
- Underground cables - We included all underground cables except for service cables and we reported all quantities in kilometres.
- Service lines - All service line replacements have all been reported in the category of less than 11kV, residential and simple type. We used this category because it represents the vast majority of service lines replaced and we do not have a systemised way to disaggregate into the various asset categories. We reported all quantities of service lines as the total number of services.
- Transformers - We included power transformers, distribution transformers and zone substation auxiliary transformers.
- Switchgear - We included high voltage distribution switchgear, high voltage circuit breakers and isolators, high voltage switchboards and gas insulated switchgear. We included expulsion drop out fuses as switches not fuses, in accordance with the RIN instructions which state that any fuse which is also capable of acting as a switch be treated as a switch. We included reclosers as circuit breakers.
- Public lighting - The public lighting variable has been reported with values of zero because the Framework and Approach Paper (F&A) did not classify public lighting to be either standard control or alternative control services.

SCADA assets

- Field devices - We included protection relays and SCADA remote terminal units.
- Local network wiring assets - We included the physical panels which house the protection relays and remote terminal units.
- Communications network assets - We included microwave terminals, dense wavelength division multiplexing (DWDM) systems, multiplexors, ultra-high frequency (UHF) systems, telemetry systems and teleprotection systems.

- Master station assets - We included our energy management system.
- Communications site infrastructure - We included battery systems, solar systems, shelters, towers/masts and server/equipment rooms.
- Communications linear assets - We included fibre optic cables and pilot cables and reported quantities in kilometres.
- AFLC - We do not have any AFLC so we reported this variable with values of zero.

Other

- Buildings - We included zone substation switchgear or control buildings.
- Instrument transformers - We included current and voltage transformers.
- Metering units -We included pole or ground mounted metering units for high voltage customers.
- Pillars - We included distribution pillar boxes.
- Substation auxiliary plant- We included battery systems and low voltage switchboards.
- Voltage regulators - We included pole-mounted distribution voltage regulators.
- Civil and Grounds - We included zone substation civil assets including roadway, earth grid, bunding and fencing.
- Fire systems - We included zone substation fire systems.
- Capacitor banks - We included zone substation capacitor banks.
- Cable tunnels - We included cable tunnels for entry/exit from zone substations and for the distribution network in Darwin's central business district. We reported quantities in metres due to the relatively low lengths.
- Power transformer refurbishment - We included major transformer overhauls, which includes bushing replacements, gasket replacements, protective devices, radiator replacement etc.
- Power transformer spares - We included purchase of spare zone substation power transformers.
- Pole refurbishment - We included plating and capping steel distribution poles.
- Tower refurbishment - We included earth upgrades or re-coating transmission towers.
- EDO refurbishment - We included one-off program to replace old expulsion drop out (EDO) fuses with a sparkless fuse type.

We calculated the annual expenditure by adding up the asset cost for those assets categorised as providing standard control services, and which were identified as repex and fit into the relevant repex category.

We calculated the annual quantity of replacements by adding up the asset volumes associated with the above expenditure.

The volume of failures per year was calculated using the following two methods:

- Asset failure data from the Maximo Event module was used. This was our preferred source of failure data but it was not available for all categories. It was available for pole-top structures, conductors, cables, service lines, transformers, switchgear and field devices.
- Where failure data was not available from the Maximo Event module, we assigned asset replacements to a failure type category. Each replacement that was driven by a functional failure (the asset was replaced after failure) contributed to the failures reported.

Both data sources excluded externally-caused failures, as required by the appendix F definition of 'Asset failure (repex)'.It should be noted that for cable and conductor failures in table 2.2.1, the volumes reported are quantity of failures, and not length of the failed asset.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
6.1 (a): Where PWC provides asset sub- categories corresponding to the prescribed asset categories in table 2.2.1, PWC must ensure that the expenditure and asset replacement / asset failure volumes of these sub-categories reconcile to the higher level asset category. PWC is required to use the additional rows and provide a clear indication of the asset category applicable to any new sub- category in the yellow input cells labelled 'OTHER BY DNSP DEFINED'; or report new sub-categories against the asset category 'OTHER' in the relevant asset group.	All of our subcategories supplied in the 'OTHER BY DNSP DEFINED' section are independent of the higher level asset categories.
6.1 (b): In instances where PWC is reporting expenditure associated with asset refurbishments/ life extensions capex it must insert additional rows at the bottom of the table 'OTHER BY DNSP DEFINED'). PWC must provide the required data, applying the corresponding asset group and category name followed by the word "REFURBISHED".	We have added additional rows for refurbishments as required.
6.1 (c): In instances where PWC considers that both the prescribed asset group categories and the sub-categorisation provisions set out in (a) do not account for an asset on PWC distribution system, PWC must use the additional rows at the bottom of the table 'OTHER BY DNSP DEFINED'.	We added new rows in the table under 'OTHER BY DNSP DEFINED' and the required data has been provided for each. All sub-categories are mutually exclusive and reconcile to the total expenditure of the asset group.

Appendix E Requirements	Consistency with requirements
PWC must provide the required data, applying a high level descriptor of the asset as the category name. PWC must ensure that the sum of the individual asset categories, including any additional sub-category, additional other asset category or asset refurbishment/ life extension asset category expenditure reconciles to the total expenditure of the asset group.	
6.1 (d): Any new categories defined by PWC in table 2.2.1 of regulatory template 2.2 must also be listed in table 5.2.1 in regulatory template 5.2, and PWC must provide corresponding asset age profile data in accordance with the instructions for regulatory template 5.2. The only exception to this is if the new categories are within the asset groups 'Pole top structures', or 'Staking wooden poles'.	We added new categories to table 2.2.1, and also added these to template 5.2 and age profile data.
6.1 (e): PWC must ensure that the replacement volumes by asset group is equal to the applicable replacement volume data provided in table 2.2.2.	The volumes in 2.2.1 reconcile to those in 2.2.2
6.1 (f): PWC must ensure that the sum fof the asset group replacement expenditures is equal to the total replacement expenditure contained in regulatory template 2.1.	The expenditures in 2.2.1 reconcile to those in 2.1

Table 2.2.2 – Selected Asset Characteristics

Source of Data

The source of both replacement quantities and assets in commission is the asset management system (Maximo). We have manually categories replacement quantity data.

Estimated or actual information

The information contains both actual and estimated data. The expenditure information for replacement quantities was sourced from our asset management system and our financial system. There was a significant amount of categorisation, mapping allocation and assumptions applied. We applied rules primarily based on our system data and expenditure attributes. If we started again and applied different assumptions it is likely that we would report values that are not materially different. Therefore, the RIN defines this as actual information. Assets in commission data was derived from the Asset Age Profile dataset and is considered estimated as a different approach may lead to materially different outcomes.

Methodology and assumptions

Replacement volumes were calculated using the Capex methodology described in appendix A of the Basis of Preparation. Feeder category was taken from Maximo data where possible, and allocated manually where it was not available. Conductor types were allocated manually, since the asset system does not record the details of the "replaced" asset, only the new asset. Transformer MVA replaced is reported as the MVA of new transformers installed under replacement projects. The transformer MVA disposed was extracted from Maximo by summing the capacity of all transformer assets which had their status changed to "DISPOSED" within the last financial year.

The volumes of assets in commission were derived from the Asset Age Profile dataset. The conductor type and feeder category were available in the source data for the majority of assets - where they were not available the unknown assets were allocated in proportion to the known assets. The MVA replaced and disposed were left blank since no assets in commission can also be replaced or disposed.

Confidential Information

There is no confidential material in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
6.2 (a): *PWC* must provide total volume of *assets* currently in commission and replacement volumes of certain *asset* groups by specified aggregated metrics. In instances where this information is estimated *PWC* must explain how it has determined the volumes, detailing the process and assumptions used to allocate *asset* volumes to the aggregated metrics	The volumes have been provided in accordance with these requirements as can be demonstrated from the methodology stated above.

Template 2.3 - Augex project data

Table 2.3.1 - Augex asset data - Subtransmission substations, switching stations and zone substations

Source of Data

The information on project costs assigned to an augex driver is sourced from Maximo, although manual adjustments were undertaken in an excel report to sort and assign the data.

Estimated or actual information

The underlying data is from Maximo, which is an internal system for capturing project costs. While we have made a number of adjustments (sorting and assignment) to the data, we consider that alternative assumptions would not have derived a materially different outcome. On this basis, we consider the information is actual as defined by the RIN.

Methodology and assumptions

General Methodology

In summary, we first identified all capital expenditure projects that were augex projects by default. This included all our extensions projects excluding any that were known to be customer connections, customer augmentation, or expenditure on the NT Build levy for long service leave for NT constructions workers.

There were many instances where our capital projects were not given the correct classifications in our asset management system and there were some projects which were a combination of replacement and augmentation works. For these exceptions, we manually assigned them to the correct category for RIN reporting. Only those assets that were part of a project which closed in the 2017-18 period were subject to detailed categorisation as further described.

We classified augmentation projects as either zone substation or subtransmission line projects for the purpose of templates 2.3(a)&(b). Projects which had zone substation assets but no subtranmission line assets were classified as a zone substation project. Projects which had subtransmission line assets and no zone substation assets were classified as a subtransmission line project. Where a project had both types of assets, it was classified in accordance with the asset type which contributed the highest capital cost.

The following table provides the calculations and inflation rates we used to convert nominal to real expenditure values.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Nominal amount **(M)**	B	C	D	E	F	G	H	I	J	K
Inflation	3.05%	3.55%	1.21%	2.39%	3.02%	1.51%	1.02%	1.93%	2.08%	2.25%

Inflation index **(N)**	121.56%	117.95%	113.91%	112.55%	109.92%	106.70%	105.12%	104.05%	102.08%	100%
Real 2017-18 amount	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N

We first identified all augmentation projects with total expenditure greater than $5m from the Capex model data. Where projects were identified that contained portions of substation works and transmission or distribution works, the project was only considered a material project if the substation component was greater than $5m.

We only included projects which were closed in Maximo in the period 2017-18. Costs for the life of the project were included. Using Excel all project transactions were consolidated and sorted into expenditure by Financial year for the life of the project. Costs were then assigned to the various RIN categorisation columns. CPI adjustment was applied to each FY categorised totals. Financial year CPI totals were then summed into overall total for entry to RIN template.

We found there were no material projects for table 2.3.1.

For non-material projects:

- We extracted the total zone substation augmentation expenditure and details from the CAPEX worksheet.
- Reviewed the project list to select only projects that were closed in 2017-18.
- Separated into non-material projects expenditure based on project value less than $5m.
- Totalled the costs for each FY over the life of the project(s).
- converted expenditure into real 2017-18 dollars using inflation data from the Australian Bureau of Statistics across the life of the project.
- Consolidated the data into a total and entered into table 2.3.1.

Confidential Information

There is no confidential information in these templates.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
Clause 8.1(a): PWC must include only projects and expenditure related to augmentation of the network.	We have only included projects and expenditure related to augmentation of our network.
Clause 8.1(b): Unless otherwise indicated, 'Rating' or 'MVA added' refers to equipment's normal cyclic rating (for substations) or thermal rating (for lines and cables). As specified in the respective definitions of normal cyclic rating (for substations) and thermal rating (for lines and cables),	We have used name plate ratings as our estimate of the normal cyclic ratings. When we use the term 'normal conditions', we mean that all items of plant are in service and the network is configured in its planned state.

Appendix E Requirements	Consistency with requirements
PWC must provide its definition(s) of 'normal conditions' in the basis of preparation.	
Clause 8.1(c): PWC must not include information for gifted assets.	We have not included gifted assets.
Clause 8.1(d): PWC must enter related party and non-related party contracts expenditures in the 'All related party contracts' and 'All non-related party contracts' columns, respectively. (i) Expenditure figures inputted into the 'All related party contracts' and 'All non-related party contracts' columns do not contribute to the column that calculates the total direct expenditure on an augex project ('Total direct expenditure'). (ii) PWC must record all contract expenditure for augex projects under the 'All related party contracts' and 'All non-related party contracts' columns. PWC must then allocate such contract expenditure to the appropriate 'Plant and equipment expenditure and volume' and 'Other expenditure columns. For example, if a non-related party contract involves expenditure on civil works, PWC must record that expenditure under the 'All non-related party contracts' and 'Other expenditure - Civil works' columns.	We do not have any related parties, so we have reported all contract expenditure as 'All non-related party contracts'.
Clause 8.1(e): PWC must not include augmentation information relating to connections in this worksheet. Augmentations in relation to connections are to be inputted in the connections regulatory template 2.5.	We excluded connections augmentations from template 2.3(a) and 2.3(b).
Clause 8.2(a): For projects with a total cumulative expenditure over the life of the project of greater than or equal to $5 million (nominal): (i) provide information requested for each augmentation project on a sub-transmission substation, switching station and zone substation owned and operated by PWC where project close occurred at any time in the relevant year; and	There were no material augmentation projects identified
Clause 8.2(b): For projects with a total cumulative expenditure over the life of the project less than $5 million (nominal) (non-material projects): (i) provide the total expenditure for all non-material augmentation projects on a sub-transmission substation, switching station and zone substation owned and operated by PWC where project close occurred in the relevent year in the last row in the table, as indicated.	We included all sub-transmission substation, switching station and zone substation projects with expenditure less than $5 million (nominal) and project close in 2017-18 in the last row of table 2.3.1

Appendix E Requirements	Consistency with requirements
Clause 8.2(c): Record all expenditure data on a project close basis in nominal dollars. (i) PWC must provide any calculations used to convert real to nominal dollars or nominal to real dollars for this purpose.	There were no material augmentation projects identified
Clause 8.2(d): For the avoidance of doubt, this includes augmentation works on any substation in PWC's network, including those which are notionally operating at transmission voltages. In such cases, choose 'Other' in the 'Substation type' category and describe the type of substation in the basis of preparation.	There were no material augmentation projects identified
Clause 8.2(e): Each row must represent data for an augmentation project for an individual substation. (i) If an augmentation project applies to two substations, for example, PWC must enter data for the two substations in two rows.	There were no material augmentation projects identified
Clause 8.2(f): Where a substation augmentation project in this table is related to other projects (including those in other tables in regulatory templates 2.3(a) and (b)), describe this relation ship in the basis of preparation.	There were no material augmentation projects identified
Clause 8.2(g): Where PWC chooses 'Other' in a drop-down list, it must provide details in the basis of preparation.	There were no material augmentation projects identified
Clause 8.2(h): For 'Substation ID' and 'Project ID', input PWC's identifier for the substation and project, espectively. This may be the substation/project name, location and/or code.	There were no material augmentation projects identified
Clause 8.2(i): For 'Project trigger', choose the primary trigger for the project from the drop down list. Describe secondary triggers in the basis of preparation. Where there is no primary trigger (among multiple triggers), choose 'Other' and describe the triggers in the basis of preparation.	There were no material augmentation projects identified
Clause 8.2(j): For substation voltages, enter voltages in the format xx/xx, reflecting the primary and secondary voltages. For example, a transformer may have its voltage recorded as 500/275, where 500kV is the primary voltage and 275kV is the secondary voltage. (i) Where a tertiary voltage is applicable, enter voltages in the format xx/xx/xx. For example, a transformer may have its voltage recorded as 220/110/33, where 220kV, 110kV and 33kV are the primary, secondary and tertiary voltages, respectively.	There were no material augmentation projects identified

Appendix E Requirements	Consistency with requirements
Clause 8.2(k): For substation ratings, 'Pre' refers to the relevant characteristic prior to the augmentation work; 'Post' refers to the relevant characteristic after the augmentation work. Where a rating metric does not undergo any change, or where the project relates to the establishment of a new substation, input the metric only in the 'Post' column.	There were no material augmentation projects identified
Clause 8.2(l): Under 'Total expenditure' for transformers, switchgear, capacitors, and other plant items, include only the procurement costs of the equipment. This must not include installation costs.	There were no material augmentation projects identified
Clause 8.2(m): Expenditure inputted under the 'Land and easements' columns is mutually exclusive from expenditure that appears in the columns that sum to the 'Total direct expenditure' column. In other words, the 'Total direct expenditure' for a particular project must not include expenditure inputted into the 'Land and easements' columns.	There were no material augmentation projects identified
Clause 8.2(n): If PWC records land and easement projects and/or expenditures as separate line items for regulatory purposes, select 'Other' and note 'Land/easement expenditure' in the basis of preparation. PWC must input expenditure directly attributable to the land purchase or easement compensation payments in the 'Land purchases' and 'Easements' columns, respectively. These costs include legal, stamp duties and cost of purchase or easement compensation payments. PWC must input other expenditure attributable to land purchases and easements in the 'Other expenditure - Other direct' column.	There were no the 'Land purchases' and 'Easements' expenditure identified.
Clause 8.2(o): Definitions: Other plant item: (i) All equipment involved in utilising or transmitting electrical energy that are not transformers, switchgear, or capacitors.	There were no material augmentation projects identified

Table 2.3.2 - Augex asset data - Sub-transmission lines

Source of Data

The information for this table is sourced from Maximo. We used an excel report from the capex model which is described in Appendix A of this basis of preparation. We also used:

- The full transaction list in "Project PRD30003 Capitalisation Spreadsheet" to allocate costs to RIN Augex Asset Data Categories and for as-installed asset quantities.
- PDF documents from RM8 records management system - Extract from Contract NPD00171-14 Downer EDI Lump Sum Price Breakdown - to determine percentage of cost assignment to RIN augex asset data Categories.
- PDF documents from RM8 records management system - Contract NPD00171-14 Downer EDI contract invoices and cost breakdown - to allocate costs to RIN Augex Asset Data Categories.

Estimated or actual information

The underlying data is from Maximo, which is an internal system for capturing project costs. While we have made a number of adjustments (sorting and assignment) to the data, we consider that alternative assumptions would not have derived a materially different outcome. On this basis, we consider the information is actual as defined by the RIN.

Methodology and assumptions

General Methodology

In summary, we first identified all capital expenditure projects that were augex projects by default. This included all our extensions projects excluding any that were known to be customer connections, customer augmentation, or expenditure on the NT Build levy for long service leave for NT constructions workers.

There were many instances where our capital projects were not given the correct classifications in our asset management system and there were some projects which were a combination of replacement and augmentation works. For these exceptions, we manually assigned them to the correct category for RIN reporting. Only those assets that were part of a project which closed in the 2017-18 period were subject to detailed categorisation as further described.

We classified augmentation projects as either zone substation or subtransmission line projects for the purpose of template 2.3(a)&(b). Projects which had zone substation assets but no subtransmission line assets were classified as a zone substation project. Projects which had subtransmission line assets and no zone substation assets were classified as a subtransmission line project. Where a project had both types of assets, it was classified in accordance with the asset type which contributed the highest capital cost.

The following table provides the calculations and inflation rates we used to convert nominal to real expenditure values.

Y	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Nominal amount **(M)**	B	C	D	E	F	G	H	I	J	K
Inflation	3.05%	3.55%	1.21%	2.39%	3.02%	1.51%	1.02%	1.93%	2.08%	2.25%
Inflation index **(N)**	121.56%	117.95%	113.91%	112.55%	109.92%	106.70%	105.12%	104.05%	102.08%	100%
Real 2017-18 amount	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N	M x N

Specific method for Table 2.3.2

We first identified all augmentation projects with total expenditure greater than $5m from the capex data. Where projects were identified that contained portions of substation works and transmission or distribution works, the project was only considered a material project if the substation component was greater than $5m.

We only included projects which were closed in Maximo in the period 2017-18. Costs for the life of the project were included. Using Excel all project transactions were consolidated and sorted into expenditure by FY for the life of the project. Costs were then assigned to the various RIN categorisation columns. CPI adjustment was applied to each FY categorised totals. FY CPI totals were then summed into overall total for entry to RIN template.

The following process was used to determine labour hour volumes:

- Average the actual labour rates applied to the project at each financial year.
- Divide the financial year labour cost by the averaged labour rate to determine labour hours per year.
- Total the labour hours per financial year to whole of project life and enter into RIN table.

The table below outlines the methodology we used to populate the table 2.3.2 variables for material projects.

Field	Methodology
Project description and changes including Project trigger(s)	We added this information on a project-by-project basis by our project and planning teams using their knowledge of the projects. Project trigger noted as 'Other'. Business case was reviewed and the primary driver noted as 'Reliability' - which is not an option in the drop down. Project was approved to mitigate major risk associated with understrength towers on the 132kV CIPs to HC Transmission Line - towers are only rated for Cat 2 to 3 Cyclone. Solution was to upgrade tower strength (new towers) to withstand Cat 4 cyclone. The towers supporting the Elizabeth River 132kV crossing were assessed as most vulnerable and most difficult to repair or replace in an emergency, therefore these were the only towers replaced under this project. The new towers were built in parallel to the energised network and therefore new conductor was also installed.

	This project has been categorised as Augmentation in accordance with final Category Analysis RIN Appendix F definitions.
Plant and equipment volume	This information was based on actuals as installed project quantities and also confirmed with as-measured assets created in the PWC geospatial system (Dekho).
Plant and equipment expenditure - poles/towers, overhead Lines, underground cables.	We used project transactions reports to identify procurement costs (excluding installation) for poles/towers, overhead Lines, underground cables. Consulted with Power Networks Project Manager to determine asset cost and categorisation cost allocation from the main contract. We then also used Contract Lump Sum Price Breakdown and Invoicing break downs to identify procurement costs (excluding installation) for poles/towers, overhead Lines, underground cables.
Plant and equipment expenditure - other plant item	There was no 'other plant item' expenditure on this project.
Plant and equipment expenditure - installation labour	All internal labour costs against the project, as well as an estimated amount of contractor labour cost (total project contractor cost excluding procurement and civil works costs) allocation same as method used for plant and equipment expenditure - poles/towers, overhead Lines, underground cables.
Other expenditure - civil works	We used project transactions reports to identify civil works costs undertaken outside of the main contract and not related to plant and equipment expenditure - poles/towers, overhead Lines, underground cables. Expenditure was inputted for construction of access tracks, construction pads and vegetation clearance. We then used Contract Lump Sum Price Breakdown and Invoicing break downs to identify civil works expenditure within the main contract not related to plant and equipment expenditure - poles/towers, overhead Lines, underground cables. Expenditure was inputted for construction of access tracks, construction pads and vegetation clearance.
Other expenditure - other direct	We did not identify any other expenditure for this variable.
Years incurred	We referred to our project expenditure data to identify the years incurred
All related party contracts	We do not have any related parties so this variable was reported with values of zero.
All non-related party contracts	We used all contract expenditure against the project.
Land and easements	We used project transactions data to identify land and easement costs.

For non-material projects:

- We extracted the total Subtransmission augmentation expenditure and details from the CAPEX worksheet.
- Reviewed the project list to select only projects that were closed in 2017-18.

- Separated into non-material projects expenditure
- Totalled the costs for each FY over the life pf the project(s)
- Converted expenditure into real 2017-18 dollars using inflation data from the Australian Bureau of Statistics across the life of the project.
- Consolidated the data into a total and entered into table 2.3.2.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN
Clause 8.1(a): PWC must include only projects and expenditure related to augmentation of the network.	We have only included projects and expenditure related to augmentation of our network.
Clause 8.1(b): Unless otherwise indicated, 'Rating' or 'MVA added' refers to equipment's normal cyclic rating (for substations) or thermal rating (for lines and cables). As specified in the respective definitions of normal cyclic rating (for substations) and thermal rating (for lines and cables), PWC must provide its definition(s) of 'normal conditions' in the basis of preparation.	We have used name plate ratings as our estimate of the normal cyclic ratings. When we use the term 'normal conditions', we mean that all items of plant are in service and the network is configured in its planned state.
Clause 8.1(c): PWC must not include information for gifted assets.	We have not included gifted assets.
Clause 8.1(d): PWC must enter related party and non-related party contracts expenditures in the 'All related party contracts' and 'All non-related party contracts' columns, respectively. (i) Expenditure figures inputted into the 'All related party contracts' and 'All non-related party contracts' columns do not contribute to the column that calculates the total direct expenditure on an augex project ('Total direct expenditure'"). (ii) PWC must record all contract expenditure for augex projects under the All related party contracts" and 'All non-related party contracts' columns. PWC must then allocate such contract expenditure to the appropriate 'Plant and equipment expenditure and volume' and 'Other expenditure columns. For example, if a non-related party contract involves expenditure on civil works, PWC must record that expenditure under the 'All non-related party contracts' and 'Other expenditure - Civil works' columns.	We do not have any related parties, so we have reported all contract expenditure as 'All non-related party contracts'.
Clause 8.1(e): PWC must not include augmentation information relating to connections in this worksheet.	We excluded connections augmentations from template 2.3(a) and 2.3(b).

Augmentations in relation to connections are to be inputted in the connections regulatory template 2.5.	
Clause 8.3(a): For projects with a total cumulative expenditure over the life of the project of greater than or equal to $5 million (nominal): (i) provide the required details for each augmentation project on a sub-transmission line owned and operated by PWC where project close occurred at any time during the years 2017-18; and	We included sub-transmission projects with expenditure greater than $5 million (nominal) and project close in 2017-18 as separate rows in table 2.3.2.
Clause 8.3(b): For projects with a total cumulative expenditure over the life of the project less than $5 million (nominal) (non-material projects): (i) input the total expenditure for all non-material augmentation projects on sub-transmission lines owned and operated by PWC where project close occurred in the years 2017-18 in the last row in the table, as indicated.	We included all sub-transmission projects with expenditure less than $5 million (nominal) and project close between 2017-18 in the last row of table 2.3.2.
Clause 8.3(c): Record all expenditure data on a project close basis in real dollars ($2017-18). (i) PWC must provide any calculations used to convert real to nominal dollars or nominal to real dollars for this purpose.	We converted nominal expenditure data to real 2017-18 expenditure data using inflation data from the Australian Bureau of Statistics. Our calculations are provided in the methodology section.
Clause 8.3 (d): For the avoidance of doubt, this includes augmentation works on any sub-transmission line in PWC's network. If PWC owns and operates any lines or cables notionally operating at transmission voltages, record any augmentation expenditure relating to such lines or cables in this table.	We did not have any augmentation projects at transmission voltages to report in this table.
Clause 8.3(e): Each row should represent data for all circuits of a given voltage subject to augmentation works under the project ID. (i) If an augmentation project applies to two circuits of the same voltage, for example, PWC must enter data for the two circuits in one row. (ii) If an augmentation project applies to two circuits of different voltages, for example, PWC must enter data for the two circuits in two rows	The augmentation project included two circuits at the same voltage and has been recorded in one row.
Clause 8.3(f): Where a sub-transmission lines augmentation project in this table is related to other projects (including those in other tables in regulatory template 2.3), describe this relationship in the basis of preparation.	We did not have any projects related to those listed in table 2.3.2.

Clause 8.3(g): Where PWC chooses 'Other' in a drop down list, provide details in the basis of preparation.	Other has been used from the drop down and the detail provided in the methodology.
Clause 8.3(h): For 'Line ID', input PWC's identifier for the circuit(s) subject to augmentation works under the project ID. This may be the circuit name(s), location and/or code.	We used our line name for the line ID.
Clause 8.3(i): For 'Project ID', input PWC's identifier for the project. This may be the project name, location and/or code.	We used our project number for the project ID.
Clause 8.3(j): For 'Project trigger', choose the primary trigger for the project from the drop down list. Describe secondary triggers in the basis of preparation. Where there is no primary trigger (among multiple triggers), choose 'Other' and describe the triggers in the basis of preparation.	We have selected the relevant project trigger.
Clause 8.3(k): For length metrics, 'km added' refers to the gross addition of the relevant length measure resulting from the augmentation work. (i) This must not be net of line or cable removal. If the augmentation project includes line or cable removal, describe the amount in basis of preparation.	We added the kilometres of line added and we did not net off the length of line removed.
Clause 8.3(l): Under 'Total expenditure' for poles/towers, include the procurement costs of the equipment and civil works. This must not include installation costs.	We have reported the procurement and civil works costs and under the 'Total expenditure' for poles/towers.
Clause 8.3(m): Under 'Total expenditure' for lines, cables and 'other plant item', respectively, include only the procurement costs of the equipment. This must not include installation costs.	We have reported procurement costs under the 'Total expenditure' for lines procurement only.
Clause 8.3(n): Under 'Total expenditure' for civil works, do not include civil works expenditure related to poles/towers. As a guide, expenditure PWC may input under 'Other expenditure - Civil works' includes (but is not limited to) construction of access tracks, construction pads and vegetation clearance.	Only expenditure for Civil works including construction of access tracks, construction pads and vegetation clearance was entered.
Clause 8.3(o): Expenditure inputted under the 'Land and easements' columns is mutually exclusive from expenditure that appear in the columns that sum to the 'Total direct expenditure' column. In other words, the 'Total direct expenditure' for a particular project must not include expenditure inputted into the 'Land and easements' columns.	We excluded land and easement costs from the 'Total direct expenditure'.

Clause 8.3(p): If PWC records land and easement projects and/or expenditures as separate line items for regulatory purposes, select 'Other' and note 'Land/easement expenditure' in the basis of preparation. (i) PWC must input expenditure directly attributable to the land purchase or easement compensation payments in the 'Land purchases' and 'Easements' columns, respectively. These costs include legal, stamp duties and cost of purchase or easement compensation payments.	Only costs directly attributable to the land purchase or easement compensation payments in the 'Land purchases' and 'Easements' columns was entered.
Clause 8.3(q): PWC must input other expenditure attributable to land purchases and easements in the 'Other expenditure - Other direct' column.	No other costs directly attributable to land and easement costs were identified.
Clause 8.3(r): Definitions: Other plant item (i) All equipment involved in utilising or transmitting electrical energy that are not poles/towers (including pole top or tower structures), lines or cables.	No zone substation assets were associated with the subtransmission project.

Table 2.3.3 - Augex data for HV and LV feeders and distribution substations

Source of Data

The information was sourced from our asset management system and our financial management system.

Estimated or actual information

The expenditure information was sourced from our asset management system and our financial system. There was a significant amount of categorisation, mapping allocation and assumptions applied. We applied rules primarily based on our system data and expenditure attributes. If we started again and applied different assumptions it is likely that we would report values that are not materially different. Therefore, the RIN defines this as actual information.

Methodology and assumptions

We calculated the units added and units upgraded per annum as the sum of all asset quantities. For example, the circuit line length units added and units upgraded were calculated for overhead high voltage feeder augmentations based on all of the following criteria:

- Service classification was standard control services.
- Expenditure category was augmentation.
- Added/upgraded was added.
- Asset type was overhead.
- Asset category was high voltage feeder.
- Asset class was conductor.
- Project expenditure was greater than $500,000.

We calculated the expenditure per annum the same way, except summing on the asset expenditure rather than the asset quantity.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
8.4 (a): Complete the table by inputting the required details.	We completed the entire table.
8.4 (b): For HV feeders owned and operated by PWC at any time during the relevant year: - for projects with a total cumulative expenditure over the life of the project of greater than or equal to $0.5 million (nominal) complete both the cost metrics table	We calculated this data for high voltage feeders as described in the methodology section.

and the descriptor metrics table by inputting the required details; - for projects with a total cumulative expenditure over the life of the project of less than or equal to $0.5 million (nominal) complete only the cost metrics table by inputting the required details.	
8.4 (c): Record all expenditure data on an	We calculated the expenditure on an as-incurred
'as-incurred' basis in nominal dollars.	basis in nominal dollars.
8.4 (d): For projects that span across regulatory years, input figures for the 'Circuit km added' and 'Circuit km upgraded' columns according to the final year in which expenditure was incurred for the project.	We added circuit kilometres based on the installation year based on the methodology described below, which in turn is based on the final year of expenditure as required.
8.4 (e): PWC must not include expenditure related to land purchases and easements in the 'Total direct expenditure' column. Land purchases and easements expenditure related to augmentation works on all HV feeders owned and operated by PWC must be inputted in table 2.3.4.	We did not include costs relating to land purchases or easements.

Table 2.3.4 - Augex total expenditure

Table 2.3.5 - Augex by driver

Table 2.3.6 - Augex greenfields driver

Source of Data

The information in these tables was sourced from our asset management system and our financial management system.

Estimated or actual information

While the expenditure information was sourced from our asset management system and our financial system, there was a significant amount of categorisation, mapping allocation and assumptions applied. We applied rules primarily based on our system data and expenditure attributes. If we started again and applied different assumptions it is likely that we would report values that are not materially different. Therefore, the RIN defines this as actual information.

Methodology and assumptions

We calculated the total expenditure in table 2.3.4 by adding the asset expenditure for each augex asset category that we assigned to standard control services and augmentation. We calculated the total expenditure in table 2.3.5 by adding the greenfield and reinforcement asset expenditure for augmentation projects that we assigned to standard control services and augmentation. We calculated the total expenditure in table 2.3.6 by adding the greenfield asset expenditure for augmentation projects that we had assigned to standard control services, augmentation and the relevant asset category.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
8.5 (a): Complete the tables by inputting the required details for: (i) the rows that summarise all augmentation works on the specified types of distribution substations owned and operated by PWC undertaken at any time during the years 2017-18 to 2023-24.	Details have been entered as instructed.
8.5 (b): Record all expenditure data on an 'as incurred' basis in nominal dollars.	Expenditure is reported as-incurred in nominal dollars.
8.5 (c): For projects that span across regulatory years, input figures for the 'Units' column according to the final year in which expenditure was incurred.	Details have been entered as instructed.

8.5 (d): "Greenfield" driven augmentation expenditure refers to expenditure that will increase the size of the network by creating new physical assets, where no facilities currently exist (for example, expansion of the network into a new industrial estate, or housing subdivision).	Projects have been reviewed individually and categorised as "Greenfield" or "Reinforcement"
8.5 (e): Reinforcement driven augmentation expenditure refers to expenditure that meets the definition of augmentation expenditure but is not greenfield driven augmentation (for example, increasing network capacity or functionality due to power quality and safety reasons).	Projects have been reviewed individually and categorised as "Greenfield" or "Reinforcement"
8.5 (f): Expenditure in table 2.3.6 should reconcile with total of greenfield driven and reinforcement driven augmentation expenditure in table 2.3.5.	Expenditure in table 2.3.6 reconciles with total greenfield and reinforcement expenditure.

Template 2.5 - Connections

Table 2.5.1 descriptor metrics

Source of Data

We used the following data sources to report variables in this table:

- Total volumes, spend and costs - Maximo
- Underground and overhead connections and mean days to connect customer - Internal dataset
- GSL breaches - Internal spreadsheet
- Customer complaints - Internal document

Estimated or actual information

While the aggregate information has been sourced from our financial systems, we have made assumptions to report the data in the form required by the AER. We do not have categorisations available in our systems, so have had to source these using the methodologies described below. Alternative assumptions and methods could have been used to derive materially different outcomes. On this basis, the information is estimated information under the RIN definitions.

Methodology and assumptions

Total spend by asset category

The total expenditure was calculated by summing the asset expenditure for the corresponding year for those assets with service classification of "SCS", expenditure category of "Connection" for each connections asset category and subcategory.

For example, the expenditure per year for Augmentation HV would be calculated using the following field values:

- Service Classification = "SCS"
- Expenditure Category = "Connections"
- Asset Category = "HV Feeder"
- Subcategory = "RESIDENTIAL"

Volumes added by asset category

The total volumes added (MVA and net circuit km) was calculated in a similar way to total spend by asset category. For Distribution Substation MVA added, the total was the sum of the "MVA Added" field described above. For Augmentation HV and Augmentation LV, it was the sum of the asset quantity for each year for those assets with the Power and Water Asset Class of Cables or Conductors.

Cost per lot

The cost per lot per year is calculated by dividing the total SUBDIVISION expenditure each year by the number of lots connected in that year. The number of lots for each project was applied in the year that the project was completed (i.e. the same year as the corresponding asset install date).

Underground and overhead connections

For underground and overhead connections, the volume of connections was not able to be extracted from the CAPEX methodology, since bulk projects are used to capture all new connections for each region and each year. A separate dataset was created that contains every work order raised against a customer connections project.

We found inconsistency in the way that work orders were raised over time and in different regions, so the work order list was manually reviewed by our connections staff. The connection officers nominated all work orders which corresponded to a new connection or connections, and for each of these allocated:

- The number of new connections resulting from the work order.
- Whether the new connections were overhead or underground.
- The Subcategory of the new connections (e.g. RESIDENTIAL, COMMERCIAL/INDUSTRIAL).

Each work order was then assigned a financial year on the basis of the date the work order was created, and the quantity of overhead and underground connections per year was extracted for each subcategory.

We note that there were no recorded new connections in the "EMBEDDED GENERATION" subcategory, as PV connections are almost always done as an upgrade to an existing connection. The number of overhead and underground connections reported in the EMBEDDED GENERATION subcategory was the number of existing connections which have been upgraded to PV metering. There are no costs recorded against these connections in RIN 2.5, since upgrade to PV metering is considered a fee-based cost and is allocated to RIN 4.3.

GSL breaches and payments

GSL payments are tracked in spreadsheets and the total for each financial year was simply summed from the associated spreadsheet. The quantity of breaches was calculated by dividing the payments by the standard GSL cost per customer. All GSL types have been included in the calculation of breaches and payments, including unplanned interruptions, connection/re-connections and notice of planned interruptions. We note that the vast majority of GSL breaches and payments are to residential customers.

Customer complaints

The volume of customer complaints was extracted by interrogating our internal record management document system (TRIM), and counting the number of complaints relating to connection services for each year.

Mean days to connect residential customer

The "mean days to connect" was calculated from the same dataset as the Overhead/Underground connections. Each work order which had been nominated as a new connection was analysed to determine a start date and a finish date.

- The start date was calculated as the scheduled start date (SCHEDSTART) if populated, and the work order creation date (REPORTDATE) if not. The reasoning is that often the customer will request a connection after a particular date, so it makes sense to measure against this date rather than the date the work order was created.
- The finish date was calculated as the earlier of the actual finish date (free text entered by user) and the physical completion date (date the work order status was changed to complete). The reasoning is that the use of these fields has changed over time and the earlier date is likely to be closest to the actual completion of the job.
- The "days to connect" for each work order is calculated as the difference between the start date and the finish date.

There are many instances where the work order was incorrectly left open for long periods, and others where the finish date is before the start date due to human error. These errors result in exaggerated or negative values for "days to connect". To remove these outliers, only results where the value was between 0 and 10 were included in the calculation of the mean.

Standard control services

The numbers reported under Standard Control Services are the same as those reported under "All". There are some Alternative Control Services related to connections such as Energisation and De-Energisation, however no appropriate section for these could be found in Table 2.5.1 so these have not been included.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with RIN requirements
10.1: PWC must ensure that the data provided for connection services reconciles to internal planning models used in generating PWC's proposed revenue requirements.	This basis of preparation relates to the historic information for the regulatory year. Our internal planning models apply for the forecast period and therefore cannot be reconciled.
10.2 PWC is not required to distinguish expenditure for connection services as either capex or opex in Category analysis workbook, regulatory template 2.5, table 2.5.1.	Capex and Opex have not been distinguished.
10.3 PWC must report expenditure data as a gross amount, by not subtracting customer contributions from expenditure data in Category analysis workbook, regulatory template 2.5, tables 2.5.1 and 2.5.2.	Customer contributions have not been subtracted from the expenditures in tables 2.5.1 and 2.5.2

10.4 PWC must report data for non-contestable, regulated connection services in Category analysis workbook, regulatory template 2.5, tables 2.5.1 and 2.5.2. This includes work performed by third parties on behalf of PWC.	We reported data for non-contestable, regulated connection services, including work performed by third parties on behalf of Power and Water.
10.5 PWC must not report data in relation to negotiated connection services or connection services which have been classified as contestable by the AER.	Negotiated services have not been included in template 2.5. Power and Water does not have any contestable connection services.
10.6 In Category analysis workbook, regulatory template 2.5, table 2.5.1 for augmentation metrics, 'km added' refers to the net addition of circuit line length resulting from the augmentation work of complex connections. Record values for total connections (standard control and alternative control) for each regulatory year in table 2.5.1 and values for standard control connections only for each regulatory year in table 2.5.1.	'km added' has been reported as instructed. Power and Water does not have any connections CAPEX defined as alternate control services, so the CAPEX components in EXPENDITURE - ALL and EXPENDITURE - STANDARDCONTROL SERVICES are the same.
10.7 The definition of complex connections provides guidance on the types of augmentation works which must be reported as connection services, as descriptor metrics for table 2.5.1 and as cost metrics for table 2.5.2.	We reviewed these definitions and applied them when calculating the data.
10.8 PWC must only report augmentation for connections in Category analysis workbook, regulatory template 2.5, relating to customer connection requests, as per the definition of connection expenditure. PWC must not double count augmentation requirements by twice reporting augmentation data in Category analysis workbook, regulatory templates 2.3 and 2.5.	Projects have been given expenditure categories which are mutually exclusive. That is we did not categorised projects as both connections and augmentation.
10.9 PWC must report the MVA added for distribution substations installed for connection services. Where MVA added must be calculated by PWC as the sum of the nameplate rating of all the distribution substations installed for the relevant year.	Data has been entered as instructed.
10.10 For each table in Category analysis workbook, regulatory template 2.5, PWC must record expenditures and volumes in only one subcategory and connection classification (i.e. connection classifications are mutually exclusive).	Expenditure and volumes have been reported against a single subcategory and connection classification as instructed.

Table 2.5.2 cost metrics by connection classification

Source of Data

The source of the information is Maximo.

Estimated or actual information

The information was sourced from our internal financial system. However, there was no systemised way to determine whether a connection or a connections project relates to Residential, subdivision or Simple Connection LV, Complex Connection LV etc. These were allocated manually as accurately as possible, but the resulting data is considered estimated data. There may have been alternative assumptions that could have resulted in materially different outcomes, so the information is defined as estimate in the RIN.

Methodology and assumptions

The total expenditure was calculated by summing the asset expenditure for the corresponding year for those assets with Service Classification of "SCS", Expenditure Category of "Connection" for each Connections Subcategory and Connection Classification, as noted in our basis of preparation for Table 2.5.1.

Standard control services

The numbers reported under Standard Control Services are the same as those reported under "All". There are some Alternative Control Services related to connections such as Energisation and De-Energisation, however no appropriate section for these could be found in Table 2.5.2 so these have not been included.

Standard control services – Capital contributions

There are two sources of Standard Control Service Capcons:

- Financial contributions made in relation to capital project expenditure on a particular project, in accordance with the Capcons policy.
- The asset value of assets gifted to Power and Water.

The dataset for financial contributions in was obtained by extracting all contributions in the period of interest from the financial system, and linking these to actual projects in the capex model. The project categorisation from the CAPEX Model was then applied to the corresponding Capcon transaction, which yielded a dataset of categorised financial contributions. The transactions which had an Expenditure Category of "Connection" were then summed by the Subcategory and Connections Classification as required by RIN Table 2.5.2.

The dataset in for gifted assets was also obtained by compiling monthly gifted asset reports into a single dataset. All gifted assets were categorised as "Connections", since the only source of gifted assets are developments relating to the connection of new customers or upgrades for existing customers.

The subcategory was manually assigned based the project description and the Connections Classification was set in accordance with the table in section 5.1.2.3. There was a minor

discrepancy between the monthly gifted asset reports and the asset values in the Fixed Asset Register. To address this, the values from the monthly reports were adjusted to meet the Fixed Asset Register values. The values in table 2.5.2 are the sum of the output from the two data sources

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with RIN requirements
10.1 PWC must ensure that the data provided for connection services reconciles to internal planning models used in generating PWC's proposed revenue requirements.	This basis of preparation relates to the historic information for the regulatory year. Our internal planning models apply for the forecast period and therefore cannot be reconciled.
10.3 PWC must report expenditure data as a gross amount, by not subtracting customer contributions from expenditure data in Category analysis workbook, regulatory template 2.5, tables 2.5.1 and 2.5.2.	Customer contributions have not been subtracted from the expenditures in tables 2.5.1 and 2.5.2
10.4 PWC must report data for non-contestable, regulated connection services in Category analysis workbook, regulatory template 2.5, tables 2.5.1 and 2.5.2. This includes work performed by third parties on behalf of PWC.	We reported data for non-contestable, regulated connection services, including work performed by third parties on behalf of Power and Water .
10.5 PWC must not report data in relation to negotiated connection services or connection services which have been classified as contestable by the AER.	Negotiated services have not been included in template 2.5. Power and Water does not have any contestable connection services.
10.7 The definition of complex connections provides guidance on the types of augmentation works which must be reported as connection services, as descriptor metrics for table 2.5.1 and as cost metrics for table 2.5.2.	We reviewed these definitions and applied them when calculating the data.
10.8 PWC must only report augmentation for connections in Category analysis workbook, regulatory template 2.5, relating to customer connection requests, as per the definition of connection expenditure. PWC must not double count augmentation requirements by twice reporting augmentation data in Category analysis workbook, regulatory templates 2.3 and 2.5.	Projects have been given expenditure categories which are mutually exclusive. That is we did not categorised projects as both connections and augmentation.
10.10 PWC must report information on connections cost metrics in Category analysis workbook, regulatory template 2.5, table 2.5.2	Standard control services expenditure has been included as instructed in the EXPENDITURE - STANDARD CONTROL SERVICES table.

that records standard control services connections expenditure by connection type for the relevant regulatory year.	
10.11 PWC must report information on connections cost metrics in Category analysis workbook, regulatory template 2.5, table 2.5.2 that records standard control services connections expenditure recovered through customer contributions. (The amount reported in this table must reconcile with that reported in table 2.1.7 for connections.)	Customer contributions relating to customer connections projects have been reported in the EXPENDITURE - STANDARD CONTROL SERVICES - CAPITAL CONTRIBUTIONS table and these figures reconcile with table 2.1.7 for connections.
10.12 For each table in Category analysis workbook, regulatory template 2.5, PWC must record expenditures and volumes in only one subcategory and connection classification (i.e. connection classifications are mutually exclusive).	Expenditure and volumes have been reported against a single subcategory and connection classification as instructed.

Table 2.5.3 - Volumes by connection classification

Source of Data

For new connections, the source of the information is an internal database for overhead and above ground connections, which have then been assigned manually to different classifications. For existing connections, the source of the information is from internal databases including PV Database, Gentrack RMS and MV90.

Estimated or actual information

The underlying source of the information relates to the data we reported on underground and overhead new connection volumes, and PV connections. We do not have systems or business records, so have used estimation method as identified in methodology and sources described in this section. An alternative method may have yielded a materially different outcome. On this basis, the reported data is also an estimate.

Methodology and assumptions

New Connections

The total volume of new connections for each subcategory in Table 2.5.3 reconciles to the sum of the overhead and underground connection volumes in Table 2.5.1. To disaggregate further into the connection classifications, the total number of unique projects completed in each year was calculated for each combination of subcategory and connection classification.

This figure was subtracted from the total volume of new connections for that subcategory. The remaining volume of new connections was then added to the simplest Connection Classification for each Subcategory.

For example, for the Residential Subcategory, the number of unique "Complex connection LV" and "Complex connection HV" projects completed in a particular year were subtracted from the total Residential connections in the same year in Table 2.5.1. The remaining value was assigned to the "Simple Connection LV" category, and their respective unique project counts assigned to the other connection classifications. The same methodology was used for the Commercial/ Industrial connection classification.

For the subdivision connection classification the same methodology was also used, except that the number of lots was used in place of the number of unique projects to allow for the fact that multiple customers could be associated with individual projects. All embedded generation new connections were assumed to be "Simple Connection LV", since all correspond to simple meter upgrades of LV customers.

Standard control services

The numbers reported under standard control services are the same as those reported under "All". There are some alternative control services related to connections such as Energisation and De-Energisation, however no appropriate section for these could be found in Table 2.5.3 so these have not been included.

Existing connections

The volume of existing connections for each Category in table 2.5.3 reconciles to the sum of the existing connections in the Economic Benchmarking RIN template 3.4.2 (Customer Numbers). The total number of existing connections were split into the main categories, Residential, Commercial/Industrial and Embedded Generation, and then further sub-categorised into simple and complex. It was determined that there are no existing connections that are could be classified as subdivison, these are counted in their respective category, Residential, Commercial/Industrial, Embedded Generation.

The basis of this categorisation was to firstly separate existing Embedded Generation connections from the total number of existing connections, based on reports from the PV Database. The remaining non-Embedded Generation connections were then categorised based on the customer type, Residential and Commercial/Industrial. Sub- categorisation was then carried out as follows:

Residential existing connections:

- Excludes connections that have Embedded Generation Connected
- Simple connection LV includes all low-voltage direct connected metering (less than 100 amps, single or three phase)
- Complex connection LV includes all low-voltage current transformer metering (greather than 100 amps, three phase only)
- Complex connection HV includes all high-voltage metering

Commercial/Industrial existing connections:

Excludes connections that have Embedded Generation Connected

- Simple connection LV includes all low-voltage direct connected (less than 100 amps, single or three phase) metering
- Complex connection HV (customer connected at LV, minor HV works) includes all low-voltage current transformer metering (greater than 100 amps, three phase only), with current transformers rated equal to or less than 200/5 amps
- Complex connection HV (customer connected at LV, upstream asset works) includes all low-voltage current transformer metering (greater than 100 amps, three phase only), with current transformers rated equal to or greater than 200/5 amps
- Complex connection HV (customer connected at HV) includes all high-voltage metering

Embedded Generation connections:

- Simple connection LV includes all LV connected Embedded Generator connections.
- Complex connection HV includes all HV connected Embedded Generator connections.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with RIN requirements
10.1 PWC must ensure that the data provided for connection services reconciles to internal planning models used in generating PWC's proposed revenue requirements.	This basis of preparation relates to the historic information for the regulatory year. Our internal planning models apply for the forecast period and therefore cannot be reconciled.
10.5 PWC must not report data in relation to negotiated connection services or connection services which have been classified as contestable by the AER.	Negotiated services have not been included in template 2.5. Power and Water does not have any contestable connection services.
10.8 PWC must only report augmentation for connections in Category analysis workbook, regulatory template 2.5, relating to customer connection requests, as per the definition of connection expenditure. PWC must not double count augmentation requirements by twice reporting augmentation data in Category analysis workbook, regulatory templates 2.3 and 2.5.	Projects have been given expenditure categories which are mutually exclusive. That is, we did not categorised projects as both connections and augmentation.
10.12 For each table in Category analysis workbook, regulatory template 2.5, PWC must record expenditures and volumes in only one subcategory and connection classification (i.e. connection classifications are mutually exclusive).	Expenditure and volumes have been reported against a single subcategory and connection classification as instructed.
10.13 PWC must report all new connections in Category analysis workbook, regulatory template 2.5, table 2.5.3.	We have entered this data as required.
10.14 PWC must report the total stock of connections as at 1 July for the relevant regulatory year in Category analysis workbook, regulatory template 2.5, table 2.5.3.	We have entered this data as required.

Template 2.6 - Non Network expenditure

Table 2.6.1 - Non-network expenditure

Table 2.6.4 - Information and communications technology - capex by purpose

Source of Data

The information was sourced from our asset management system (Maximo) and the trial balance and fleet records.

Estimated or actual information

The historic opex costs are based on the expenditure calculated in our historic operating expenditure methodology in Appendix C, which includes a process relating to labour recovery adjustments. If we had used alternative methods, our non-network opex may have been materially different, and therefore the information is defined by the RIN as estimated information.

The capex information used to calculate the non-network information was sourced from Maximo. For capex, our calculations and assumptions would not have a material impact on the overall outcome and therefore the RIN defines the capex information in tables 2.6.1 and 2.6.4 to be actual information.

Methodology and assumptions

Non-network expenditure - opex

We used the historic operating expenditure methodology in **appendix C** to calculate the non-network opex for IT and communications, motor vehicles and buildings and property in table 2.6.1. We did not identify any 'other' non-network costs.

In the case of motor vehicles expenditure, our accounts did not provide adequate information to disaggregate the expenditure information for the relevant vehicle type. However, we captured considerable information about our leased fleet, including vehicle, lease cost, fuel cost, kilometres travelled and more from the actual monthly fleet statistics report provided by PWC's Fleet Coordinator.

We used the fleet lease rate per vehicle and fuel costs to allocate the total motor vehicles cost into the vehicle categories in table 2.6.1.

Non-network expenditure - capex

We used the capex methodology in appendix A to establish the non-network capex costs in table 2.6.1. Using the capex methodology, we first identified the expenditure that was by default associated with the non-network category, which was based on our category of non-system expenditure.

There were many instances where non-network projects had not been given the correct classifications in our asset management system. In these cases, the relevant assets were manually assigned to the appropriate expenditure category.

There were also instances where non-network expenditure related to non-SCS expenditure such as metering or streetlights. These were also corrected manually in the methodology.

From 2017-18, according to our Fixed Assets Plan capitalisation policy (3.3), non-network expenditures costing less than $20K are to be capitalised in a low value pool asset. All assets which had been classified as standard control services and non-network were subject to further categorisation to enable asset costs to be disaggregated into the non-network asset categories in table 2.6.1.

Service subcategory

We mapped all standard control services non-network projects the service sub category using the project descriptions as follows:

- IT & communications - Computer hardware or software and communication equipment
- Motor vehicles - Vehicle accessories or fitouts
- Buildings and property - Storage systems, shelving, air conditioning, fencing etc. (for non-network facilities only)
- Other - plant and equipment - Tools, test equipment, pumps, compressors, ladders etc.

Asset category

For standard control services non-network fleet, we mapped each project to the following asset categories based on work order information:

- Car - Sedan or smaller
- Light commercial vehicle - 4wd or van
- Elevated work platform (LCV) - Not applicable as we do not have work platforms less than 4.5 tonnes
- Elevated work platform (HCV) - EWP
- Heavy commercial vehicle - Crane or crane truck

We had to undertake project-by-project reviews to identify the purpose of each non-network IT and Communications project. This analysis was done by reviewing each category and assigning the most suitable category in accordance with the definitions in appendix F of the RIN.

For standard control services non-network IT and communications expenditures, we mapped each project to the following asset categories based on work order information using the project description rules set out below:

- Outage management systems- Establishment of the new outage management system.
- Business analytics - Software or systems to support business analytics.
- Portable radio - Hand-held portable radios.
- Audio visual - General audio-visual equipment such as projects, monitors, conference room equipment.

- Mobility - Relating to mobile hardware and software tools to support network maintenance.
- 400mhz band relocation - Major project to relocate Power and Water mobile radios to a new frequency for regulatory compliance.

For standard control services non-network other expenditures, we mapped each project to the following asset categories based on work order information:

- Test equipment - "Tester" in description or a card/component/module associated with test equipment
- Tools - Drills, crimpers, cutters and other tools
- Other - All assets not fitting the above categories

The expenditure for each variable was calculated by summing the project expenditure associated with the relevant categories described above.

Confidential Information

There is no confidential information in the tables.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 11.1: If expenditure is directly attributable to a non-network expenditure category it is a direct cost for the purposes of this Category analysis workbook, regulatory template 2.6. For the avoidance of doubt, only non-network capex and/or opex direct costs should be reported in table 2.6.1 and these amounts must reconcile to non-network capex and opex directs costs reported in Category analysis workbook, regulatory template 2.1.	Only direct costs have been report as instructed. The expenditure in template 2.6 reconciles to the non-network expenditure in tables 2.1.1 to 2.1.4.
Clause 11.2: In relation to the non-network other expenditure category, if PWC has incurred $1 million or more (nominal) in opex or capex over the last five regulatory years for a given type or class of assets (e.g. mobile cranes), PWC must insert a row in the Category analysis workbook, regulatory template 2.6, table 2.6.1 and report that item separately.	Test equipment capex had expenditure of over $1m and was reported separately.
Clause 11.4: Report ICT capex by purpose and asset category in Category analysis workbook, regulatory template 2.6, table 2.6.4, in accordance with the definitions in this notice.	Data has been entered as instructed.

2.6.3 - Annual descriptor metrics - IT and communications expenditure

Source of Data

We sourced employee numbers as the total number of employees from template 2.11. The system Alloy Navigator is our Ticket Management System, from which the mobile devices was sourced.

For non-mobile assets such as laptops, desktops, phones and monitors the information came from the Department of Corporate and Information Services.

Estimated or actual information

We used a combination of reports on users and devices, together with employee numbers from template 2.11 of the Category Analysis RIN to complete the information. Alternative methods may have provided a materially different outcome, and for this reason the information is defined as estimated.

Methodology and assumptions

We sourced employee numbers as the total number of employees from template Category Analysis 2.11. Further information can be found in this basis of preparation on our methodology for template 2.11.

Our total populations of users and devices were identified by specific entity within the corporation that corresponded with the user and device, and whether the entity provided standard control services, at least to some degree.

For Financial Year 2017-18, The mobile devices were calculated using the purchase date and the economic life for that product. Data from the previous financial period was also included to ensure that assets purchased prior to FY18, but had not expired were included.

For non-mobile devices, the total number of devices on hand as at 30 June 2018 was used to determine the number of devices. Monitors were excluded from these figures as they didn't meet the AER definition of devices as being 'hardware devices that accesses services made available by a server and may include desktop computers, laptops, tablets and thin client interfaces and handheld end user computing devices including smart phones.

Where the entities costs were partly attributed to standard control services opex we applied that percentage to allocate only part of the user or number of devices to standard control services. Finally, to establish the average number the amount entered into the template, we calculated the average over a two year period.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 11.3: Report volume data in Category analysis workbook, regulatory template 2.6, table 2.6.3. Where a requested value is not constant across a year, calculate an approximate simple average based on the different values over the year and the period for which the different values applied. For example, if PWC had 12 vehicles for 8 months and 14 vehicles for 4 months, the average vehicles in the class over the year would be 12*(8/12) + 14*(4/12) = 12.67 vehicles.	Our employee numbers, user numbers and number of devices are not constant during the year. We have used a simple average for each of these amounts as required by the AER.

2.6.3 - Annual descriptor metrics - motor vehicles

Source of Data

The information used was from our fleet records, IT asset register, user directory and HR records.

Estimated or actual information

All the source data used in calculating the values for table 2.6.3 was from our fleet records. We made many allocations which could have been made a number of different ways and could have resulted in materially different values being reported. The RIN defines this information to be estimated.

Methodology and assumptions

Our fleet records (the monthly fleet statistics report provided by the NT Fleet) contained adequate information for us to map every vehicle to the AER's categories. Further, the fleet data included periodic odometer readings for every vehicle and details of whether the vehicle was owned or leased. We used these records to calculate the annual averages for each metric being:

- Kilometres travelled
- Number purchased
- Number leased
- Number in fleet
- Proportion of total fleet expenditure

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 11.3: Report volume data in Category analysis workbook, regulatory template 2.6, table 2.6.3. Where a requested value is not constant across a year, calculate an approximate simple average based on the different values over the year and the period for which the different values applied. For example, if PWC had 12 vehicles for 8 months and 14 vehicles for 4 months, the average vehicles in the class over the year would be 12*(8/12) + 14*(4/12) = 12.67 vehicles.	Our number of Motor Vehicles are not constant during the year. We have used a simple average for each of these amounts as required by the AER.

Template 2.7 - Vegetation Management

Table 2.7.1 - Descriptor metrics by zone

Source of Data

We have used the following data sources to report variables in this template:

- Vegetation management activity and task information (task type, location, date) - External contractor information
- Feeder attributes (length, names, category) - GIS
- Vegetation Management Expenditure - Asset management system

Estimated or actual information

The data provided comprises both estimate and actual information. We explain the justification for each variable below:

- Number of maintenance spans, total length of maintenance spans, and average number of trees per maintenance span - All data related to activities and volumes are materially based on historical data provided by our vegetation management contractor. This data has not been historically requested by us or provided by the contractor. This information is not sourced from our internal systems or other records. Alternative assumptions may have led to materially different results, and therefore the information is an estimate based on the RIN definition.
- Length of vegetation corridors- Data was not available from our contractors as it is not supported by their systems. This was estimated based on text descriptions in Maximo Work Orders and Purchase Orders. This information is materially dependent on our systems and the assumptions used to calculate the length of the corridors are not considered to lead to materially different results. Therefore, this information is defined by the RIN to be actual information.
- 2017-18 route line length - Calculated based on Power and Water's GIS system ESRI and without the need to make significant assumptions. The RIN, therefore, defines this to be actual information.

Methodology and assumptions

We use external contractors to manage the majority of our vegetation management activities and the contractor's data has been a key source in reporting the variables in table. The vegetation management contract has two parts.

Part A is routine cyclical maintenance of vegetation within the clearance space on all lines except transmission lines. Part B is non-routine additional work as requested by us either on a quotation or schedule of rates basis. This includes work such as the trimming or removal of hazard trees, vegetation maintenance along transmission lines, the maintenance of power line corridors by slashing, mulching and/or ground line treatments.

Our contractor has recorded the vegetation management activity data associated with Part A (routine cyclical maintenance) of the contract for the full year from 2013-14 for the Darwin and Alice Springs regions and from 2014-15 for the Katherine and Tennant Creek regions. The primary data collected by the contractor include inspection date, feeder name, the GPS location for each inspection.

This location is recorded in the general vicinity of the span but the same tree could be reported at different GPS co- ordinates based on the mobile technology used and the location of the inspector when the report is completed. The GPS location for each inspection as recorded in the general vicinity of the span but the same tree could be reported at different GPS co- ordinates. This can be based on the mobile technology used and the location of the inspector when the report is completed, the number of vegetation trims on mains and service lines, and the number of removals under four different size categories.

The number of live line trims were also recorded in inspector's comments. Each trim/removal recorded relates to a tree so this has enabled the total number of defects in the clearance space to be reported.

We assigned a unique identification number (SPAN_ID) to every span in its network in our Geographic Information System (GIS) and linked every inspection to a SPAN_ID by the GPS co-ordinates associated with the inspection and trim. This enabled key attributes of the span to be linked with each inspection. These attributes include our current feeder name, region, regulatory category, span type, voltage and length which were then merged with our inspection data. This combined data was used to complete each variable in Table 2.7.1 as discussed below.

We have minimal data for Part B of the contract relating to non-routine activities. Therefore, the reported data does not include quantities from any trimming or removal activities undertaken under Part B of the contract.

Further, spans that had been decommissioned after inspections were not associated with a feeder or regulatory category since no SPAN_ID was available in GIS. Therefore, these vegetation management activities have not been included in the data in Table 2.7.1. The error associated with this is small (about 1 to 2 % of the total in any period).

Data related to slashing and mulching activities completed under Part B of the contract was recorded in Power and Water's financial and work's management system - Maximo. This data was recorded against a feeder and this enabled slashing and mulching quantities to be associated with the reporting zones and is therefore included in table 2.7.1.

Specific details associated with the data for each variable in table 2.7.1 are described in the following sections.

Route line length within the zone

The route line length is the aggregate length in kilometres of transmission, sub- transmission, distribution and service lines. This is measured as the length of each span between poles and/or towers, where each span is counted only once irrespective of how many circuits it contains. The measurement does not include vertical components such as line sag. Service line length has only

been included to account for the part of the service line that we are responsible for, that is, up to the point two metres beyond the property boundary.

Historical route length of the network is not recorded as our GIS is a live system, which only shows the current network. Our basis of preparation for the economic benchmarking template has a more detailed description of this process in the section that relates to template 3.7 (Operating Environment).

The following sections explain the detailed methodologies that are specific for individual types of circuits.

Methodology for HV and LV route length

LV conductors that share spans with HV are identified by buffering HV conductors which are 9 meters either side of the line (9m is the maximum separation between HV and LV conductors in shared HVLV spans). The identified LV conductors within the buffer are then clipped and excluded from length calculations. Length is calculated for HV conductors and the remaining unclipped LV conductors to get the route length. This avoids double counting and is illustrated in the following diagram.

Methodology for service lines

Service line lengths up to 2m within property boundaries were added to the HV and LV route length.

Methodology for transmission lines

Transmission lines apply a similar method as for HV and LV lines. Circuit lengths on dual circuit sections of line had the length of one circuit clipped to provide the actual route length.

Number of maintenance spans

The number of maintenance spans include those subject to active vegetation management practices in the relevant year. That is, spans that have had trimming or removal activity completed. This number does not include spans that were only inspected and required no further maintenance activity before the next cycle.

The Darwin and Katherine regions both have a planned six-monthly inspection cycle. Consequently, some spans have had vegetation treatment more than once within the same year. These spans were identified only once, so that no span was double counted in the total number of maintenance spans.

The process we used to assign SPAN_ID's to each span was unable to distinguish between adjacent spans in some cases. For example, if GIS does not have a record of a particular pole between a mains span and adjoining service span(s) only a single span was identified. In these instances, the adjacent spans were assigned the same SPAN_ID. This resulted in multiple inspections with the same SPAN_ID on the same date.

Our Analysis of the data for SPAN_ID's with multiple inspections on the same date and a treatment associated with each inspection has enabled us to correct the data for the number of maintenance spans. Where a SPAN_ID has more than one inspection on the same date and with treatment associated with each inspection, the number of maintenance spans has been corrected to reflect the total number of spans with treatment on the same date.

Total Length of Maintenance Spans

As described above, the total length of maintenance spans has been calculated as the aggregate length in kilometres of all maintenance spans, measured as the length of each span between poles and/or towers, and where the length of each span is considered only once irrespective of how may circuits it contains.

Where multiple spans have been assigned the same SPAN_ID, the length associated with the SPAN_ID has been used for each span to calculate the total length of maintenance spans. This avoids double counting the length of any spans.

Length of Vegetation Corridors

The length of vegetation corridors is the aggregate length of corridors slashed and/or mulched in the relevant period regardless of the width of slashing or mulching. The width of the corridors slashed or mulched depends on the type and number of lines within the corridor.

Average Number of Trees per Maintenance Span

The average number of trees per maintenance span has been estimated by dividing the total number of trims and removals by the total number of maintenance spans.

We do not capture the height or species of trees, which is required by the RIN definition. However, this estimate assumes that all trees trimmed are consistent with the AER's definition of a tree as a perennial plant (of any species including shrubs) that is equal to or greater in height than 3 metres (measured from the ground) and of a species which could grow to a height such that it may impinge on the vegetation clearance space of power lines.

Average frequency of cutting cycle

The average frequency of the cutting cycle is the average planned number of years (including fractions of years) between which cyclic vegetation inspection and maintenance is performed within the vegetation management zones. Power and Water has been using the following planned cutting cycles: Darwin Region (0.5 year), Katherine Region (0.5 year), Tenant Creek (1.5 years), and Alice Springs (1.5 years).

Confidential Information

There is no confidential information in these tables.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 12.5: Fill in Workbook 3 - Category analysis, regulatory template 2.7, tables 2.7.1 and 2.7.2 for each vegetation management zone, adding additional tables where required.	We completed both tables using the methodology described below.
Clause 12.8: If PWC records poles rather than spans, the number of spans is the number of poles less one.	We captured spans rather than poles.
Clause 12.9: If PWC does not record the average number of trees per maintenance span, estimate this variable using one or a combination of the following data sources: 1. Encroachment defects (e.g. identified by ground or aerial inspections, or LiDAR) and/or records of vegetation works scoping, or GIS vegetation density data; 2. Field surveys using a sample of maintenance spans within each vegetation management zone to assess the number of mature trees within the maintenance corridor. Sampling must provide a reasonable estimate and consider the nature of maintenance spans in urban versus rural environments in determining reasonable sample sizes. 3. Vegetation data such as: 1. the Normalised Difference Vegetation Index (NDVI) and maps available from the Bureau of Meteorology (BOM); 2. data from the National Vegetation Information System (VIS data) overlaid on network GIS data to assess the density of vegetation in the direct vicinity of the maintenance spans; or	We do not routinely record the average number of trees per span and do not have actual data for this variable. The methodology used to estimate the average number of trees per span is in the following methodology and assumptions section. It relies on contractor data consistent with "(d) Any other data source based on expert advice".

3. similar data from other sources such as Geoscience Australia or commercial suppliers of satellite imagery overlaid on network GIS data records. 4. Any other data source based on expert advice. 5. When completing the templates, if PWC can provide actual information for the average number of trees per maintenance span it must do so; otherwise PWC must provide estimated information.	
Clause 12.10: If PWC performs vegetation management work on multiple cutting cycles in urban and CBD, or rural areas within its nominated vegetation management zones, provide a simple average of all the cutting cycles in the relevant area.	We have provided a guide to our different cutting cycles in the methodology and assumptions section below, including our derivation of a simple average.

Table 2.7.2 - Expenditure metrics by zone

Source of Data

The vegetation management activity and information such as task type, location and date are sourced from information provided by Power and Water's external contractor. Feeder attributes are sourced from GIS, while vegetation management expenditure is sourced from Maximo.

Estimated or actual information

The total vegetation management expenditure information is based on Maximo (Asset Management System) data and, while there was considerable data allocation, alternative approaches would not have resulted in a different total vegetation management expenditure. Therefore, the total vegetation management expenditure is defined by the RIN to be actual information.

However, the individual variables within table 2.7.2 were materially dependent on our contractor's data and many allocations were made to calculate the information required in the Table. Alternative assumptions may have led to materially different data. Therefore, all information in this table 2.7.2 is defined by the RIN to be estimated information.

Methodology and assumptions

General methodology

Our vegetation management expenditure information was extracted from our Asset Management System (Maximo), and attributed to the variables in table 2.7.2. For further details on how the total vegetation management expenditure was established refer to appendix B of this document. There are two components of vegetation management expenditure:

- All financial transactions and associated information related to vegetation contracts were extracted. Each transaction has been categorised by the type of work required such as tree trimming, hazard tree cutting, ground clearance and vegetation corridor clearance based on the descriptions in the Purchase Order and Work Order. Where descriptions could be interpreted to be more than one category, the transaction was allocated to the category which our staff considered most suitable.
- Each transaction was also allocated to a specific feeder so that expenditure could be categorised by the vegetation zone based on feeder location. However, some feeder names and network configurations have changed during the reporting period. In the instances where financial information was initially allocated to feeders that no longer existed, that financial information was re- allocated to most suitable current feeder based on specific mapping rules.

We capture time of internal staff for various activities, including to support the vegetation management contractor, in Work Orders within the AMS. Through this process, all work orders in AMS for the reporting period have a work category assigned, including Vegetation Management.

Some vegetation management work orders did not include adequate information to allocate the expenditure to the specific variables in table 2.7.1. Power and Water allocated these costs proportionally based on the direct contractor expenditure against each variable, which is consistent with the approved CAM.

Tree Trimming (excluding hazard trees)

Tree trimming expenditure includes expenditure incurred to trim or remove trees/vegetation, to remove dead or living parts so as to prevent parts of the tree or vegetation from growing into, falling onto, or blowing on to electricity assets. This expenditure was allocated using contractor data. Expenditure associated with assets that have been subsequently decommissioned is included in the expenditure reported here. This variable also excludes inspection and auditing costs which are reported separately in this table.

Hazard Tree Cutting

Expenditure associated with hazard tree cutting is associated with the trimming or removal of vegetation that is normally outside the clearance space, but its condition is such that it presents an unacceptable risk of trees, limbs or branches falling into electricity assets.

Ground Clearance

Expenditure associated with ground clearance work involves clearing of vegetation on power line corridors at ground level and application of herbicide where required by ground crews. This work is generally required in areas where other mechanical means are not possible such as on rocky ridges and around tower bases.

Vegetation Corridor Clearance

Expenditure associated with slashing and mulching activities to maintain powerline corridors has been reported under this variable. No other expenditure is included in this variable.

Inspection

Inspection costs have not been recorded separately. However, the vegetation contractor has advised that inspection costs are approximately 4% of the total tree trimming cost. This expenditure has therefore been estimated at 4% of the total tree trimming cost and reported under this variable.

Vegetation Audit

Vegetation audit costs have not been recorded separately with the exception of an audit carried out on the Urban area of Alice Springs. The vegetation contractor has advised that generally audit costs are approximately 1.5% of the total tree trimming cost. This expenditure has therefore been estimated at 1.5% of the total tree trimming cost and reported under this variable for each region except Alice Springs. Costs for Alice Springs regions have been taken directly from a purchasing information available in Maximo. This is also specifically identified in the data source R&M Model 17-18.

We do not record own audit costs separately. Our auditing is undertaken by the Vegetation Contracts Manager which has been allocated as discussed further below.

Contractor Liaison Expenditure

Contractor liaison expenditure is not separable from other activities undertaken by vegetation contract managers within Power and Water. Where possible, work orders to which contract managers allocate their time for vegetation related activities have been identified. However, these work orders do not separate auditing, contract liaison, contract administration and other activities related to the monitoring of vegetation condition and contractor performance. For these reasons, costs allocated to the work orders used to allocate time by contract managers have been spread proportionally across the other activities to which expenditure was able to be directly allocated.

Tree Replacement Program Costs

Power and Water does not have a tree replacement program so no costs have been incurred against this variable.

Other vegetation management costs not specified in sheet

No other vegetation costs have been identified. Costs other than direct vegetation management contractor costs have been allocated proportionally across the expenditure metrics. This includes supervision costs, traffic control and permit costs which all support the execution of the defined metrics/activities and would not be otherwise incurred.

Confidential Information

We have identified that the data on vegetation management is confidential and should not be disclosed. Further information is provided in our completed confidentiality template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 12.5: Fill in Category analysis, regulatory template 2.7, tables 2.7.1 and 2.7.2 for each vegetation management zone, adding additional tables where required.	We completed both tables as required.
Clause 12.11: If hazard tree clearance expenditures are not recorded separately, include these expenditures within tree trimming expenditure.	We identified hazard tree clearance expenditure where possible. Any expenditure not identifiable is included in tree trimming expenditure by default.
Clause 12.12: If ground clearance works are not recorded separately, include these expenditures within tree trimming expenditure.	We have identified ground clearance expenditure where possible. Any expenditure not identifiable is included in tree trimming expenditure by default.
Clause 12.13: Only include expenditure on inspections where PWC inspects solely for the purpose of assessing vegetation. Include inspection expenditure for inspections assessing both PWC's assets and vegetation under maintenance (Workbook 3 - Category analysis, regulatory template 2.8).	We were not able to identify specific expenditure for these inspections and an allowance has been made as set out in Section 12.3.2.6.

Clause 12.14: If auditing of vegetation management work is not recorded separately, include these expenditures within inspection expenditure.	We were not able to identify specific expenditure for these inspections and an allowance has been made as set out in Section 12.3.2.7.
Clause 12.15: Annual vegetation management expenditure across all categories and zones must sum up to the total vegetation management expenditure each year. In Workbook 3 - Category analysis, regulatory template 2.7, table 2.7.2, add any other vegetation management expenditure not requested in any other part of Workbook 3 - Category analysis, regulatory template 2.7 (or added in Workbook 3 - Category analysis, regulatory template 2.8) in total annual vegetation management expenditure. In the basis of preparation, explain the expenditures that have been included in this table.	All vegetation management expenditure has been allocated to the defined variables in Workbook 3 - Category analysis, regulatory template 2.7, table 2.7.2.

Table 2.7.3 - Descriptor metrics across all zones - unplanned vegetation events

Source of Data

The information on vegetation events was based on staff knowledge.

Estimated or actual information

We have used staff knowledge to estimate the data. An alternative assumption may have derived a different value to zero.

Methodology and assumptions

We have no records of vegetation events. We have recorded zero for this value based on our staff's knowledge.

We have developed our own standards and procedures for the clearances of vegetation from power lines because there are no specific legislative requirements governing the establishment of easements and the management of vegetation in the vicinity of power lines. In addition, work is carried out in accordance with the following Standards and Guidelines:

- Pruning of Amenity Trees (AS4373-2007)
- ENA Procedures for Safe Vegetation Management Work Near Live Overhead Lines.

We have also developed document NP021, *Easement Guidelines 2008*, to specify the requirements for and permitted activities on easements to secure right of access for the construction and maintenance of power lines on the corridor. This document specifies standard easement widths to facilitate the control of vegetation that potentially may contact conductors.

In addition, we also developed the clearance standards shown in the table below for the maintenance of vegetation in the proximity of power lines. An allowance for regrowth which depends on tree species and location is added to these distances to determine the actual clearance distance required for the cycle time being used. Compliance with these standards as far as possible is a requirement in vegetation management contracts.

Type of Powerline	Current Clearances	Comments
Insulated Low Voltage (Services and ABC)	0.5m	
415V	3.0m	
11kV, 22kV	3.0m	No overhanging branches
66kV	4.0m	No overhanging branches
132kV	6.0m	No overhanging branches
High Voltage Aerial Bundled Cable	1.0m	

These standards have been developed to ensure sufficient clearance of vegetation from powerlines to allow for conductor sag and sway and to reduce the risk of vegetation related interruptions to supply.

In many cases, particularly in urban and semi-rural areas, there is limited regrowth space available in addition to these clearances because of the close proximity of property lines to the powerlines and the high density of customer vegetation along property lines. This coupled with high vegetation growth rates has resulted in the need for shorter cycle times (6 months currently) in these areas to maintain acceptable vegetation clearances. Customers generally will not grant approval for excessive trimming of their vegetation to enable longer cycle times to be implemented.

Our standards, as described above, establish the minimum clearance for routine and non-routine vegetation management and the cutting cycles for routine cutting. The cost impact of these cycles is as follows:

- The minimum clearance standard means a certain amount of vegetation needs to be removed or otherwise managed and disposed. With all else being equal, we would incur more expenditure if clearance standards were increased.
- The cutting cycles drive the number of times our contractor undertake patrols to perform routine vegetation cutting. With all else being equal, we would incur more expenditure if cutting cycles were more frequent.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 12.16: In Category analysis workbook, regulatory template 2.7, table 2.7.3, fill out the unplanned vegetation events table once, providing the requested information across PWC's entire network.	We reported zero events because we do not have any records of these events occurring.
Clause 12.17: PWC is not required to provide information requested in Workbook 3 - Category analysis, regulatory template 2.7, table 2.7.3 where it does not currently have it.	As above, we have no events to report.
Clause 12.4: Provide, on separate A4 sheets, maps showing: 1. each vegetation management zone; and 2. the total network area with the borders of each vegetation management zone.	The maps of the nominated zones are provided in Appendix D of this Basis of Preparation.
Clause 12.7: For each vegetation management zone identified, provide in the basis of preparation: 1. a list of regulations that impose a material cost on performing vegetation management works (including, but is not limited to, bushfire mitigation regulations);	We not subject to any specific vegetation management legislation. As discussed below we have developed standards and procedures to carry out our vegetation management activities

2. a list of self-imposed standards from PWC's vegetation management program which apply to that zone; and 3. an explanation of the cost impact of regulations and self-imposed standards on performing vegetation management work.	

Template 2.8 - Maintenance

Table 2.8.1 - Descriptor metrics for routine and non-routine maintenance

Table 2.8.2 - Cost metrics for routine and non-routine maintenance

Source of Data

Our data was sourced from Maximo and SCADA systems using the backcast methodology described in Appendix B of this Basis of Preparation.

Estimated or actual information

There is a mix of estimated and actual data reported in this template. For:

- Asset Quantity at Year End – This is based on asset management system data and is therefore considered actual data.
- Asset Quantity Inspected and Maintained – This is a combination of estimated and actual data. The actual component is the quantity of maintenance events, which comes directly from Maximo work order data. The inspected data is an estimate, since there are no systemised records of each asset that is inspected. The estimate provided is based on a certain proportion of the asset base was inspected each year in line with the maintenance strategy at that time, which is considered a reasonable assumption.
- Expenditure data - The expenditure information was sourced from our asset management system and our financial system. There was a significant amount of categorisation, mapping allocation and assumptions applied. We applied rules primarily based on our system data and expenditure attributes. If we started again and applied different assumptions it is likely that we would report values that are not materially different. Therefore, the RIN defines this as actual information.

Methodology and assumptions

The maintenance expenditures and volumes are an output of the R&M methodology described in appendix B. The high-level categorisation includes Service Classification, Expenditure Category and Asset Class were performed as described in the appendix.

The mapping from our work order details to the "Routine Maintenance" and "Non-routine Maintenance" Expenditure Categories are shown below.

AER Expenditure Category	Work Category	Work Type
Routine Maintenance	REPAIRSMAINTENANCE	PREVENTATIVEMAINT
Non-Routine Maintenance	REPAIRSMAINTENANCE	PLANNEDMAINTENANCE

As outlined above, work orders with Work Category of "REPAIRSMAINTENANCE" and Work Type of "PREVENTATIVEMAINT" or "PLANNEDMAINTENANCE" were defaulted to the "Routine Maintenance" and "Non-routine Maintenance" Expenditure Category respectively.

There were many instances where work orders had not been given the correct Power and Water classifications.

A maintenance asset category was assigned to each "Routine Maintenance" and "Non- routine Maintenance" work order in the R&M methodology by mapping from the Power and Water Asset Class. In some cases a single Power and Water Asset Class mapped to multiple Maintenance Asset Categories, so other work order or asset details such as feeder category or work order description were used in these cases. The table below outlines the Maintenance Asset Categories and the Power and Water Asset Classes which map to each. The full set of mapping rules are outline in the "Mapping" worksheet of the R&M methodology.

Asset Class	Maintenance Asset Category
Buildings	ZSS Property
Cable Tunnels	DIST - CBD
Cable Tunnels	DIST - Non-CBD
Cables	DIST - CBD
Cables	DIST - Non-CBD
Cables	Service lines
Cables	TRANS - CBD
Cables	TRANS - Non-CBD
Capacitor Banks	ZSS Other Equipment
Civil and Grounds	ZSS Property
Communications	Communications
Conductors	Poletop and OH line maintenance
Conductors	Service lines
Distribution Poles	Poletop and OH line maintenance
Distribution Substations	Distribution Substation Property
Distribution Substations	Distribution Substations Earth Mats
Distribution Substations	Distribution Substations Transformers
Distribution Switchgear	Distribution Substations Switchgear
Easements	Access tracks
Fire Systems	ZSS Property
GIS	ZSS Other Equipment

HV Circuit Breakers	ZSS Other Equipment
HV Switchboards	ZSS Other Equipment
Instrument Transformers	ZSS Other Equipment
Metering Units	Pole top and OH line maintenance
Outdoor Disconnectors and Busbars	ZSS Other Equipment
Pillars	Pillars
Pole tops	Pole top and OH line maintenance
Power Transformers	ZSS Transformers
Protection	Protection
SCADA	SCADA
Substation Auxiliary Plant	ZSS Other Equipment
Transmission Poles and Towers	Pole top and OH line maintenance
Voltage Regulators	Distribution Substations Switchgear

There were many instances where a single work order was raised for works on multiple asset classes. These are referred to as "bulk" work orders, and typical scenarios are:

- Timesheet work orders for non-trades and administrative labour.
- Inspection work orders which cover multiple asset classes, such as zone substation inspections, feeder inspection and transmission patrols.
- Journal entries.

These were assigned a Maintenance Asset Category of "multiple", with further disaggregation of these costs.

For Table 2.8.1, the asset quantities and average age were taken from the Asset Age Profile dataset. The Asset Age Profile (REPEX) Asset Categories and Groups were used to map directly to a Maintenance Asset Category. We note that where an asset's age was unknown, it has been excluded from the average age of asset group calculation.

We also note that the maintenance asset category "Service Lines" has been reported as number of service lines, not number of customers listed in the Asset Quantity. There are many instances where multiple customers are supplied by a single service and the number of service is considered the more appropriate quantity in this context.

The inspection cycles were assigned using our staff's knowledge and can be verified in the Maximo PM module against the various asset classes.

The asset quantities inspected / maintained were an output of the R&M model. The data was aggregated from two sources.

The first source was a count by year of all the Routine Maintenance and Non-Routine Maintenance work orders against the Maintenance Asset Category in question. To avoid double counting, the inspection/maintenance task was only attributed to the year in which the expenditure first occurred, not in all years with expenditure.

Separate analysis was undertaken for assets which are inspected as part of bulk patrols or inspections (i.e. with Asset Class of "multiple"). In this case, the quantity inspected is the proportion of the asset quantity at year-end which was required to be inspected in accordance with the current maintenance strategy. For example, the feeder inspection strategy in requires every pole to be inspected every three years, so the asset quantity inspected is one third of the number of poles at year end. Where an asset has been inspected/maintained multiple times within a year, it has been counted multiple times.

The results of the two separate analyses were aggregated into table 2.8.1.

It should be noted that the asset quantities for cables were reported as number of maintenance events rather than kilometres of cable. Maintenance events on cables were typically unrelated to the length of the cable - typically repairing a fault or replacing a joint or termination - so there was no method to convert this into a cable length

The expenditure for Routine Maintenance was calculated in a similar fashion to the quantities, with two separate sources of expenditure calculated then aggregated.

The first source is calculated by summing the expenditure for the corresponding year for each Maintenance Asset Category in Table 2.8.2. For example, Pole tops and overhead lines expenditure used the following field values:

- Service Classification = "SCS"
- Expenditure Category = "Routine Maintenance"
- Maintenance Asset Category = "Pole tops and overhead lines"

Separate analysis was undertaken for work orders with a Maintenance Asset Class of "Multiple". Inspection and patrol work orders were assigned weightings against each of the Maintenance Asset Categories in accordance with the types of activities involved. E.g. overhead feeder inspections were split across the "Pole Inspection" and "OH Asset Inspection" categories in proportions that represented the estimated amount of time spent on each. For bulk labour work orders the costs were simply apportioned to the Maintenance Asset Categories relevant to the owner of the work order, in proportion to known costs for those Maintenance Asset Categories.

The results of the two separate analyses were aggregated into Table 2.8.2. Refer to worksheet "2.8" in the R&M methodology for more details.

The expenditure for non-routine maintenance was calculated in the same way as described for Routine Maintenance.

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
13.1: For expenditure incurred for the simultaneous inspection of assets and vegetation or for access track maintenance, report this expenditure under maintenance, not vegetation management.	We did not identify expenditure relating to the simultaneous inspection of assets and vegetation. Access track maintenance has been reported as maintenance and not vegetation management as instructed.
13.2: For each of the maintenance subcategories prescribed in the template, add rows for additional subcategories if these are material and necessary to disaggregate financial or non- financial data, for example, to disaggregate asset groups according to voltage levels or to specify inspection/ maintenance cycles	Additional lines have been added for Pillars and Communications, as these have material expenditure and unique maintenance cycles.
13.3: For each maintenance subcategory, provide in separate columns the data for inspection cycles and maintenance cycles.	Data has been entered as instructed.
13.4: For the inspection cycle for each maintenance subcategory, express this as 'n' in the statement 'every n years'. For example, if the inspection cycle is 'every 6 years', put '6' in the inspection cycle column.	Data has been entered as instructed. For maintenance cycles less than one year, the number entered is the fraction of the year. E.g. Power Transformers are inspected monthly, so the inspection cycle is 0.083.
13.5: Similarly, for the maintenance cycle for each maintenance subcategory, express this as 'n' in the statement 'every n years'. For example, if the maintenance cycle is 'every 3 years', put '3' in the maintenance cycle column.	As above.
13.6: For inspection and maintenance cycles, asset quantity, and average age of the asset group, use the highest-value (i.e. highest replacement cost) asset type in the asset group as the basis.	Data has been entered as instructed.
13.7: Where there are multiple inspection and maintenance activities, report the cycle that reflects the highest cost activity.	Data has been entered as instructed.
13.8: Adding rows for additional maintenance subcategories to indicate inspection or maintenance cycles (i.e. non-financial data) does not require disaggregating the corresponding financial data for those additional subcategories.	Additional rows have been disaggregated as these correspond to different asset classes with material maintenance expenditure.
13.9: For 'Asset Quantity', provide in separate columns: (a) the total number of assets (population) at the	The total number of assets at year end has been derived from the asset age profile data. The number of assets actually inspected has been

end of the regulatory year, for each asset category; (b) the number of assets actually inspected or maintained during the regulatory year, for each asset category.	estimated from work order counts and inspection/maintenance cycles. Where an asset has been inspected / maintained multiple times within a year, it has been counted multiple times.
13.10 For 'Other maintenance activity', add rows for maintenance expenditure subcategories if these are material and if these are not yet included in any other maintenance expenditure subcategory.	Additional lines have been added for Pillars and Communications, as these have material expenditure and unique maintenance cycles.

Template 2.9 – Emergency Response

Table 2.9.1 - Emergency response expenditure (opex)

Source of Data

The data source for major event days is the outage dataset inclusive of SAIDI, SAIFI and GSL.

Estimated or actual information

All data provided in template 2.9 is considered actual data to the extent that it derives from our financial systems and that any manual adjustment is reasonable. An alternative method would not have resulted in materially different data.

Methodology and assumptions

The Emergency Response expenditures are an output of the R&M Methodology described in appendix B. Work orders with Work Category of "REPAIRSMAINTENANCE" and Work Type of "UNPLANNEDMAINTENANCE" were defaulted to the "Emergency Response" Expenditure Category.

There were many instances where work orders had not been given the correct Power and Water classifications. In these cases the relevant work orders were manually assigned to the correct categories.

The expenditure for Emergency Response was calculated by summing the expenditure for the corresponding year using the following field values:

- Service Classification = "SCS"
- Expenditure Category = "Emergency Response"

There was 2 major event day reported in template 6.3. The first one was Tennant Creek MED UFLS event that occurred the 29 October 2017. There was no expenditure related to the Tennant Creek MED UFLS event. The system was restored remotely via system control. The second event was Tropical Cyclone Marcus which occurred on 17 March 2018.

The expenditure relating to each event was calculated as the total costs on the related work orders. A small amount of expenditure which occurred in the 2018/19 financial year has been excluded. Work orders relating to the event were located in Maximo by searching for Emergency Response work orders created on the day of the event. Any work orders which were obviously unrelated to the event were excluded.

The expenditure per day was extracted from Maximo. A query was used to sum the transactions on the work orders identified by date. It should be noted that the expenditure for each day in table 2.9.1 (c) is based on the date that work was undertaken and not the date of the financial transaction. In some cases, timesheets dates were incorrectly entered prior to the event - these costs were assigned to the day of the event. Again, a small amount of expenditure which occurred in the 2018/19 financial year has been excluded.

Confidential Information

There was no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
Clause 14.1: Report the following expenditure for each regulatory year: 14.1 (a) total emergency response expenditure;	Total emergency response expenditure has been entered for the 2017/18 regulatory year
14.1 (b) emergency response expenditure attributable to major events by identifying direct costs through a specific cost code for each major event or major storm. Major events most often refer to, but are not limited to, a major storm;	Total emergency response expenditure has been reported against each major event based on the expenditures on work orders related to the event.
14.1 (c) emergency response expenditure attributable to major event days by identifying daily operating expenditure incurred on each date of those major event days and summing up the expenditure for each event.	The expenditure by day of each major event has been reported.

Template 2.10 - Overheads

Table 2.10.1 - Network overheads expenditure

Table 2.10.2 - Corporate overheads expenditure

Source of Data

The information in template 2.10 is based on our financial accounts and asset management system data.

Estimated or actual information

The information in template 2.10 is materially dependent on our financial accounts and asset management system data. To calculate the overhead expenditure we made a number of assumptions and allocations using our operating expenditure methodology described in Appendix C. These included the labour recovery adjustment, which has resulted in our associated operating expenditure information becoming estimated information under the RIN definition.

Methodology and assumptions

We used our operating expenditure methodology to calculate the network overhead operating expenditure required for table 2.10.1 and 2.10.2. Our approach identified which of our financial accounts are associated with the corporate overheads or network overheads as defined by the RIN. After identifying the overhead costs we attributed some of these costs directly to standard control services. The remainder of unallocated overhead costs were allocated to standard, alternative control services and our unregulated services.

The basis of the allocation of overhead costs was the ratio of direct costs attributed to the individual service to the total direct costs of all services.

Our capitalised network overheads are, by default, allocated to standard control services. However, we allocated a portion of expenditure to alternative control services and our unregulated services, consistent with the allocations of opex overheads. In 2017-18, we capitalised corporate and network overhead costs using the operating expenditure methodology. These costs were capitalised as they relate to overhead management costs associated with capital projects.

For other distribution services, a portion of the capitalised overheads has been applied to unregulated services. We do not provide any negotiated services so this variable was complete with values of zero.

Confidential Information

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 15.1: Report overhead expenditure before it is allocated to direct expenditure. Report the total amounts allocated to opex and capex for standard control services and alternative control services, and report total amounts allocated to negotiated services and unregulated services in each regulatory year.	We reported overhead expenditures that could not be directly attributed to another expenditure category. The overhead expenditures reported relate to standard control services, alternative control services and our unregulated activities. No overhead expenditure was attributed to the direct expenditure categories.
Clause 15.2 (a): For Category analysis workbook, regulatory template 2.10, table 2.10.1 Network overhead - For other network overheads (opex and capex) provide details of the expenditures included in the category, and identify any expenditures that contribute greater than 5 per cent of total network overheads in any regulatory year.	Our other network overheads (capex and opex) do not exceed 5% of the total in any year. We have included an allocation of overheads to the unregulated networks and unregulated streetlighting services we provided over the reporting period.
Clause 15.2 (b): For Category analysis workbook, regulatory template 2.10, table 2.10.2 Corporate overhead - For other corporate overheads (opex and capex) provide details of the expenditures included in the category, and identify any expenditures that contribute greater than 5 per cent of total network overheads in any regulatory year.	Our other corporate overheads (capex and opex) exceeded 5% of total corporate overheads in all years but one. We have included an allocation of overheads to the unregulated networks and unregulated streetlighting services we provided over the reporting period. The details about these expenditures were calculated are explained in the operating expenditure methodology.
Clause 15.3(a): If there is any overhead expenditure that is capitalised by PWC report the total amounts allocated to standard control services and alternative control services in each regulatory year;	We have capitalised overhead expenditure and included them in template 2.10
Clause 15.3 (b): If there is any overhead expenditure that is capitalised by PWC explain, in the basis of preparation, why it is capitalised;	Our explanation why we have capitalised overhead expenditures is contained in our operating expenditure methodology in appendix C.
Clause 15.3 (c): If there is any overhead expenditure that is capitalised by PWC and if there is a material change in reported expenditures due to a change in capitalisation policy, identify the expenditure categories and quantum of capex and opex that are affected and explain this in the basis of preparation.	A discussion about of capitalised overheads is contained in our operating expenditure methodology in appendix C.

Template 2.11 - Labour

Table 2.11.1 - Cost metrics per annum

Table 2.11.2 – Extra descriptor metrics for current year

Source of Data

The average staffing level information (ASL) in template 2.11.1 was sourced from the reporting application for HR, Boxi-HR. Data for 2017-18 was obtained from the Department of Corporate Information Services (DCIS) via our HR Services Department. For the total labour expenditure template the payroll information was provided by DCIS. The template 2.11.2 for average productive work hours per ASL and ordinary time was sourced from HR, HR-Boxi. The stand down occurrences by ASL was sourced from Maximo.

Estimated or actual information

The information provided is estimate. We did not have systems to provide the data in the form required by the AER's RIN requirements. An alternative method may have resulted in materially different outcomes, and so the information is estimated.

Methodology and assumptions

We used a report of full time equivalent employees, which was produced for every pay period of the reporting period. Our first step was to categorise all employees using PWC organisational charts and job titles to allocate to the AER RIN position classifications. Then we mapped every individual to a business unit in order to link the position to the activity.

Employees in our corporate, system control and retail entities were allocated time to Power Networks. This is because staff in those entities only commit part of their time to Power Networks. Our allocation was based on the portion of the costs of those entities allocated to Power Networks. For example, if 30% of the cost of the entity is allocated to Power Networks in the financial accounts, then 30% of the FTEs are attributed to Power Networks.

The next step in the allocation was to apply the percentages that were developed to allocate overheads to standard control services. For example, if 83% of overheads were allocated to standard control services, then 83% of the Power Networks FTEs were allocated to standard control services.

The ASL amounts reported were calculated as the average, over the year, of the standard control services FTE for Power Networks (including the portion of the Corporate and System Control staff) for each function and job category required.

Total Labour Expenditure

We calculated the labour expenditure using the mapping of FTE described above and their annual payroll cost to create a set of percentages of total salary for each job classification required.

We then applied the above percentages to allocate the total labour cost for standard control services into the table. The total labour cost for standard control services was calculated using our operating expenditure methodology.

Average Productive Work Hours per ASL

All employees were mapped using the labour mapping as explained above then percentages were applied based on the employees time spent working in Power Networks. To establish the total productive hours recreational leave, public holidays, sick leave and training hours were removed. From here the Standard Control Services labour percentage was allocated to produce the actual Standard Control Services. The average was calculated using the AER function and AER position.

Stand Down Occurrences per ASL

The Maximo report contains employee time sheeted information. The first step was to obtain the entity and business unit from the DCIS report, then to map the individuals to the AER classifications in the same way as described above. The Standard Control Services percentage was applied to the average occurrences.

Average Productive Work Hours Per ASL - Ordinary Time per ASL

The same principle applied with for the Average Productive Work Hours with the exclusion of training hours. The hours reported were averaged using the AER function and AER position.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 4.1 Only labour costs allocated to the provision of standard control services should be reported in the labour cost tables in the Category analysis, regulatory template 2.11.	We have reported our standard control services labour costs in template 2.11.
Clause 4.2: Labour used in the provision of contracts for both goods and services, other than contracts for the provision of labour (i.e. labour hire contracts) must not be reported in these tables.	We have reported our internal labour and labour hire contractors in template 2.11.
Clause 4.3: PWC must break down its labour data (both employees and labour contracted through labour hire contracts) into the classification levels provided in the relevant table in the template. PWC must explain how it has grouped workers into these classification levels.	We have broken down the labour costs into the required categories.
Clause 4.4: Labour related to each classification level obtained through labour hire contracts may be reported separately on separate lines to employee based labour. If PWC wishes to do this they should add extra lines in the	We have not reported labour hire separately.

regulatory template below each classification level for which it wishes to separately report labour hire.	
Clause 4.5: The total cost of labour reported in Category analysis, regulatory template 2.11 must equal the total labour costs reported against the capex and opex categories relevant to standard control services listed in Category analysis workbook, regulatory template 2.12.	We have reconciled the labour costs reported in templates 2.11 and 2.12.
Clause 4.6: Quantities of labour, or expenditure should not be reported multiple times across labour tables However, labour may be split between tables (for example one worker could have half of their time allocated to corporate overheads and half of their time to network overheads).	We have only reported labour costs and quantities once.
Clause 4.7: The ASLs for each classification level must reflect the average paid FTEs for each classification level over the course of the year.	Our ASL calculations are based on employee pay period data.

Template 2.12 - Input Tables

Table 2.12 - Input tables

Source of Data

The information contained in template 2.12 was sourced from Maximo and the financial accounts.

Estimated or actual information

There is a mix of actual and estimated data in this template,

The information presented in this template is based on a range of actual data from our financial and asset management systems.

The assumptions made to disaggregate our internal direct standard control services activities into labour, materials and other costs is based on internal knowledge of financial and asset management systems and our internal activities. We consider the information to be actual information under the RIN definition.

The disaggregation of the other opex labour costs is based on the historic operating expenditure methodology described in Appendix C. As a result this information is defined by the RIN to be estimated information.

Methodology and assumptions

We have collated this data based on the categorisation of data contained in template 2.1 (see our Basis of Preparation for this template for further information) and the underlying analysis explained in the capex, R&M and opex methodology described in the appendices.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 5.1: Only input costs allocated to the provision of direct control services should be reported in the input cost tables in Category analysis workbook, regulatory template 2.12.	We reported all costs associated with Standard Control Services and Alternative Control Services to capture all Direct Control Services only.
Clause 5.2: PWC must break down its costs into labour, materials, contract and other costs. PWC must explain what inputs have been reported as other.	We have broken our costs into labour, material, contract and other costs as required.
Clause 5.3: Quantities of expenditure should not be reported multiple times across the labour, materials, contract and other tables and should not be reported multiple times across the capex and opex categories	We have only reported amounts of expenditure once. No expenditure has been double counted in this table.

listed in Category analysis workbook, regulatory template 2.12.	
Clause 5.4: For contract expenditure, PWC must separately estimate the proportions attributable to labour, materials and other inputs for each capex and opex category listed in Category analysis workbook, regulatory template 2.12.	As per the template provided by the AER, no breakdown of contractor expenditure is required to be reported.

Template 4.2 - Metering

Table 4.2.1 - Metering descriptor metric

Table 4.2.2 - Cost metrics

Source of Data

The data was sourced as follows:

- Type 2, 3 and 4 meter populations - MV 90
- Type 6 meter population - RMS and MV 90
- Volumes for meter purchase, installation and replacement volumes -RMS and Meter Movement Advice
- Volumes for meter investigation, scheduled meter reads and special meter reads -RMS and NT planner
- Remote reading and remote configuration volumes -MV90 and RMS
- Total expenditure for metering services - Audited statutory and regulatory accounts and Maximo for capex

Estimated or actual information

The information is actual. The information is either sourced from our financial or metering systems or from our asset management system.

Methodology and assumptions

In the sections below, we identify the methods and assumptions for each table in the template. We currently do not have Type 1 and Type 5 meters. For this reason, we have reported a zero value for these meter types in all tables.

Our general methodology for reporting data has relied on the following systems and sources to report the information for this template:

- Retail Management System (RMS) - This captures billing data for all of our customers. It provides a basis for determining the total meter population at a point in time, and the characteristics of the meter. It also captures location information which has been used to determine if the meter is regulated or non-regulated. RMS is also a system that logs service request information. These codes have enabled us to estimate volumes for different RIN sub-categories such as meter investigations.
- MV90 - This is a system that captures annual consumption data for remotely read meters (ie: type 2, 3 and 4 meters). It provides an accurate basis for identifying the number of remotely read meters. It also provides information on energy consumption that enables us to determine the number of Type 2, 3 and 4 meters. It must be noted that, there is a one to one relationship between a connection point and a meter. However, the NMI may consist of multiple meters. To determine the type of meter at that connection point, the aggregated

amount of annual energy from each meter is calculated which determined the meter type for that NMI. Audited statutory accounts and regulatory accounts - At a high level we ensured that the sum of reported metering expenditure reconciled to template 2.1 of the RIN. Appendix A, B and C of this document provide details on this methodology.

- Maximo - We have used the work orders (replacement of meters, new metering installations etc) relating to metering in Maximo (our asset management system) to manually allocate expenditure to RIN sub-categories.

Metering descriptor metrics

The RIN table requires us to identify the number of regulated meters by meter type. It then requires further categorisation of these meters into single phase or multi-phase, and by the number of meters that are current transformer connected or direct connected.

RMS provides a reasonably accurate basis for identifying the total regulated meter population as at July 2018. RMS provides location data, which has been used to determine if a meter is likely to be in a regulated or non-regulated area. For those generation and market meters, RMS does not held this information and related information is extracted from MV90 as the basis to identify populations.

The first step of our methodology was to assign the meter population to a Meter Type for 2017-18 based on an extract of the system data as at July 2018. The MV90 System records information on energy consumption for remotely read meters. The energy consumption data has been used to map meters to Type 2, 3 and 4 metering installations. We did not have type 1 metering installations in the Northern territory during 2017-18.

Unlike previous years reporting, we NMIs as a means of identifying customer installation sites in 2017-18. It is important to note that there could be situations where one NMI can have multiple meters attached to that NMI. That means to determine the meter type for that NMI, we have aggregated the amount of energy registered for each meter attached to that NMI to determine the meter type. These will impact on the number of meters reported. Consequently, the number of meters will be greater than the number of NMIs.

We extracted the number of all billing meters out of RMS. RMS does not contain wholesale, generation or operational (network) metering details. The number of meters for type 3 and 4 billing metering installations in RMS were reconciled against types 3 and 4 billing metering installations in MV90.

The number of regulated type 6 meters in 2017-18 was achieved by deducting the number of total number of meters in MV90 from the total regulated population identified in RMS (i.e. residual calculation approach).

As for types 2, 3 and 4, wholesale, generation and related check metering installations, the meter details were extracted from MV90 and reconciled against a report from the Market Operator to identify meters used for settling the market.

The second step was to calculate the number of meters by Meter Type for 2017-18. RMS is a live system which does not have the ability to take snapshots of the meter population over time. We

used the MV90 consumption report to determine the types of meters for type 2,3 and 4. The remaining population of meters were assigned to type 6 metering installations.

The third step was to use RMS data for 2017-18 to determine the proportion of single phase to multi-phase meters for each Meter Type. This information is a direct reporting element in RMS as at July 2018.

The final step was to use RMS data for 2017-18 to determine the proportion of current transformer connected meters to directly connected meters by meter ratings. We assigned meters with a rating of 0-1999 to the direct connected category and meters with a rating above 1999 to a current transformer connected category. The meter rating data for 2017-18 was available in RMS. All wholesale and generation metering is known to be three phase CT and VT connection metering.

Cost metrics

This template requires us to provide expenditure and volumes on sub-categories of metering expenditure such as meter purchases and special meter tests.

We have used two independent systems to extract metering expenditure by the AER sub-categories in the RIN (Maximo and FMS). For this reason, we used best endeavors to map the RIN metering sub-categories to total metering expenditure.

The first step was to use our audited statutory and regulatory accounts as the basis for determining the total expenditure in each year for Metering Services. The sum of reported metering expenditure in Table 4.2.2 reconciles to template 2.1 of the RIN. The information for Capex was provided by Asset management team and for opex, the information was provided by PWC Regulatory team.

The second step was to use work orders in Maximo (our asset management system) to manually allocate metering expenditure to RIN sub-categories. The codes in Maximo provide a basis for determining if expenditure relates to a metering service. Our staff then manually examined each work order to map the expenditure to the most relevant RIN sub- category activity. The cost of labour and material of the meter replacement and new metering installation was obtained from works order numbers in Maximo relating to these activities. There are two separate works order numbers firstly, labor cost and secondly the material cost. The labor cost is reported under subcategory meter replacement and new meter installation. However, the cost of material is reported under subcategory of meter purchase.

The third step involved reconciling the total amount from work orders in Maximo to the audited accounts.

The RIN requires the expenditure on IT infrastructure and communications infrastructure to be reported. However, these terms are not defined in the RIN. We have understood these terms to relate to commissioning and maintaining infrastructure that is required for the provision of metering services. PWC outsources its IT and communications services, as such we do not own the associated infrastructure. As a result, we have reported all infrastructure costs as zero.

Our IT and communications expenditure has been reported as non-network - IT expenditure in table 2.6 (Non-network). We have also not reported any overhead costs in table 4.2.Metering has all overhead expenditures reported in table 2.10 Network overheads.

It is important to note that the cost associated with meter purchase is made up of total material cost of new meter installations and replacement for 2017/2018. There was two method used to determine the number of reported meter purchase and associated expenditure. As the meters are purchased in bulk, the meters purchased during the financial year may or may not be deployed on site for that Financial Year. Consequently, we used the existing works order numbers and Project IDs to determine the volume of meters and reconcile this to the expenditure associated with meter purchase and the variance in cost is included in overall expenditure reporting. The labour cost for these activities are reported under each sub categories in table 4.2.2.

In respect of volumes, we used the following data source and estimation techniques for each sub-category:

- Meter purchase - We assumed that meter purchases are the sum of meter installations and replacements. The underlying data is explained in the dot points below relating to "new meter installations" and "meter replacements". A key assumption is that meter purchases occur in the year that the meter was installed or replaced. We used this assumption because we do not have accurate records on meter purchase in our asset management system or store inventory.
- Meter testing - We used a report from the CT Meter database and meter Laboratory test report to identify meters tested during the period.
- Meter investigations - RMS contains service requests for remotely read and non-remotely read meters respectively, except for wholesale metering installation, generation metering and operational (network) meters (all type 2s, some type 3s and 4s). We have identified codes most relevant to meter investigations based on our staff's judgement. All service requests relating to non-remotely read meters have been assigned to Type 6 meters. We have allocated remote meter investigations to Type 4 metering installations.
- Scheduled meter reads - We have reported zero for Type 2 to Type 4 meters, as these are remotely read meters. The 2017-18 data for Type 6 meters is based on an internal spreadsheet of planned manual meter reads during the financial year of 2017-18. The data on the planned manual reads spreadsheet is updated from reading data taken from MVRS (Multi-vendor reading system). Data has been maintained through 2017-18, read data has been split between regulatory and non-regulatory based on the read sequence number and physical location.
- Special meter reads - We used a similar methodology to meter investigations, as described above. We have assumed that particular service request codes in RMS correspond to a special meter read. Similar to meter investigations, the data in RMS is available for remotely read and non-remotely read meters. For remotely read meters, we have assumed that there

were no special meter reads for Type 2 or Type 3 meters based on staff knowledge. We have therefore assigned the special meter reads for remotely read meters to Type 4 meters only.

- New meter installations - We used a combination of information from RMS and electronic MMAs. The electronic MMA was still under development during the period, consequently seven variations of the MMA were used and each variation had a report. Each report was cleansed of errors and irrelevant data, the reports were merged into a single report. A report was created from RMS to show all meter installations during 2017-18 and a similar report was created to show all removed meters during 2017-18, both reports were cleansed of errors and irrelevant data. The Electronic MMA report was merged with the Installed Meter report using the New Meter Number as a common value. The resultant report was merged with the Removed Meter report using the RMS Installation Number as a common value. The data was then further cleansed, anomalies investigated and corrective actions taken where necessary. Where an installation had only a new meter it was deemed to a be a new meter installation. Meter type classifications were added based on the model of the new meter installed (Type 6 or interval).
- Meter replacements - The methodology for Meter replacement was the same as New Installation above. The difference being where both a removed meter and installed meter were present it was deemed to be a meter replacement.
- Remote reading - We used MV90 data to determine the number of meters requiring remote reads. We then multiplied the population by the average estimated yearly reads for a remote meter. This was based on the assumption that we would read the meter on a weekly basis, final monthly bill, and 6 ad hoc periods, resulting in an average of 70 reads per year per meter. Due to the relatively high number of meter replacements where type 4 meters were installed during 2017-18, reports were run on a monthly basis from MV90 to determine the meter population on a monthly basis and these monthly population numbers were used in this calculation.
- Remote configuration - The reported data for Type 4 meters was based on service request codes in RMS to convert existing meters to time of use or to enable PV.

Confidential Information

There is confidential information in these templates relating to our metering costs. As noted in our confidentiality template we consider this information to contain market sensitive inputs.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the Requirements
Clause 17.1: PWC must ensure that the data provided for metering services reconciles to internal planning models used in generating PWC's proposed revenue requirements.	The information we have provided in this template is historic information, and therefore will not reconcile to our forecast estimate of costs for metering services.

Clause 17.2: PWC is not required to distinguish expenditure for metering services between standard or alternative control services in Workbook 3 - Category analysis, regulatory templates 4.2.	We can confirm that we have reported all metering costs, irrespective of whether the service is alternative or standard control.
Clause 17.3: PWC is not required to distinguish expenditure for metering services as either capex or opex in Workbook 3 - Category analysis, regulatory templates 4.2.	We have reported total expenditure as required by the AER.
Clause 17.4: PWC must report data for non-contestable, regulated metering services. This includes work performed by third parties on behalf of PWC.	We have reported data for non-contestable regulated metering services only.
Clause 17.5: PWC must not report data in relation to metering services which have been classified as contestable by the AER.	We have not reported data for metering services that are contestable.

Template 4.3- Ancillary Services fee-based services

Table 4.3.1 - cost metrics for fee-based services

Source of Data

The source of the information used was our financial management system and Maximo for financial data. The volumes were obtained in part from service requests and also estimated by our team.

Estimated or actual information

The majority of the information was sourced from our systems. However, the volumes used to disaggregate the data were based on staff experience and judgement. Therefore, the RIN defines this information to be estimated information.

Methodology and assumptions

We collated the reported data from our financial accounts. Firstly, we identified fee-based services expenditure based on the relevant accounts. Secondly, we identified R&M work orders that were fee-based services, and we reconciled the amounts to ensure no costs were double counted or missed. This was based on our R&M methodology in appendix B and opex methodology in appendix C.

The above method allowed us to capture the total cost of fee-based services. However, we do not have complete information about the number of activities we undertook. Therefore, the disaggregation of the fee-based expenditure and the volumes were estimated.

Our method has changed from previous years due to a better way to estimate volume data. Previously, we used service request data to identify volumes and staff judgment.

For 2017-18, the source of total fee-based was based on work orders in Maximo. However Maximo did not provide a reliable source to allocate into individual services. For this reason, we considered billing data in RMS was a more reliable source. These volumes were prorated to derive a percentage for these services. These percentages were used as a driver to disaggregate the fee-based services expenditure into the individual services.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 16.1: PWC must ensure that the data provided for fee-based and quoted services reconciles to internal planning models used in generating PWC's proposed revenue requirements	We have provided the required data, however it is historic data and therefore cannot be reconciled with the forecast revenue requirements.

Clause 16.2: Category analysis workbook, regulatory templates 4.3 and 4.4, PWC must list all of its fee-based and quoted services.	All fee and quoted services have been listed.
Clause 16.3: In the basis of preparation, PWC must provide a description of each fee-based and quoted service listed in Category analysis workbook, regulatory templates 4.3 and 4.4. In each services' description, PWC must explain the purpose of each service and detail the activities which comprise each service.	We have provided this description in section 19.2 of our regulatory proposal.
Clause 16.4: PWC is not required to distinguish expenditure for fee-based and quoted services between standard or alternative control services in Category analysis workbook, regulatory templates 4.3 and 4.4.	All fee and quoted services are ACS.
Clause 16.5: PWC is not required to distinguish expenditure for fee-based and quoted services as either capex or opex in Category analysis workbook, regulatory templates 4.3 and 4.4.	We have reported the total capex and opex associated with these services.

Template 4.4 – Ancillary services quoted services

Table 4.4.1 - Cost metrics for quoted services

Source of Data

The source of the information used was our financial management system and Maximo for financial data. The volumes were obtained in part from service requests and also estimated by our team.

Estimated or actual information

The majority of information was sourced from our systems. However, the volumes used to disaggregate the data were based on the experience and judgement of our managers. Alternative methods may have led to materially different outcomes, and for this reason the data is defined as 'estimated'.

Methodology and assumptions

We collated this data from the financial accounts. Firstly, we identified quoted services expenditure based on the relevant accounts. Secondly, we identified a number of R&M work orders that were quoted services and we reconciled the amounts to ensure no costs were double counted or missed. This was based on our R&M methodology in appendix B and opex methodology.

The above methodology captured expenditure associated with quoted services that were less than $5,000. Quoted services with costs greater than $5,000 were accounted for as work in progress. The work in progress associated with these services is expensed on completion.

As the RIN requires expenditure to be reported on an as incurred basis, we needed to report expenditure, when it was booked to the WIP account. Therefore, for RIN purposes the expenditure is reported when incurred based on WIP accounts rather than on project completion.

The above method allowed us to capture the total cost of quoted services but we do not have complete information about the number of activities we undertook. Therefore, the disaggregation of the quoted services expenditure and the volumes were estimated.

To estimate the volumes, all available work orders data from Maximo was collated. Also, the volumes were reviewed and categorised by our staff who have experience in carrying out these activities.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause 16.1: PWC must ensure that the data provided for fee-based and quoted services reconciles to internal planning models used in generating PWC's proposed revenue requirements.	We have provided the required data, however it is historic data and therefore cannot be reconciled with the forecast revenue requirements.
Clause 16.2: Category analysis workbook, regulatory templates 4.3 and 4.4, PWC must list all of its fee-based and quoted services.	All fee and quoted services have been listed.
Clause 16.3: In the basis of preparation, PWC must provide a description of each fee-based and quoted service listed in Category analysis workbook, regulatory templates 4.3 and 4.4. In each services' description, PWC must explain the purpose of each service and detail the activities which comprise each service.	We have provided this description in section 19.2 of our regulatory proposal.
Clause 16.4: PWC is not required to distinguish expenditure for fee-based and quoted services between standard or alternative control services in Category analysis workbook, regulatory templates 4.3 and 4.4.	All fee and quoted services are ACS.
Clause 16.5: PWC is not required to distinguish expenditure for fee-based and quoted services as either capex or opex in Category analysis workbook, regulatory templates 4.3 and 4.4.	We have reported the total capex and opex associated with these services.

Template 5.2 - Asset Age Profile

Table 5.2.1 - Asset age profile

Source of Data

The data was sourced as follows:

- Asset age profile – The Asset Age Profile data extract from Maximo
- Maximo Asset Data - Asset Age Profile Data Extract From Maximo
- Protection Asset Data – Protection panel assets
- SCADA & Comms Asset Data - S&C Asset Age Profile
- Asset Financial Lives - FMS Current Asset Category List
- Protection Asset Data - Protection Relay Classifications
- Asset Valuation Report - SKM Asset Verification & Valuation Report - Power Networks Regulated Electricity Network (September 2013)

Estimated or actual information

The data provided is estimated. For installed assets we note that many assets had installation dates which were unknown or incorrect. This means that alternative assumptions may result in different outcomes, so information is estimate as defined by the RIN. Economic life and standard deviation data all asset categories is estimated data, as does not come from internal systems and alternative assumptions may result in materially different values.

Methodology and assumptions

The source for the majority of age profile data is the Maximo asset management system. While some asset data can be extracted from the Geographical Information System (GIS), the systems are integrated and configured such that asset data is supposed to be synchronised and identical in both systems.

In practice this is not always the case and there are ongoing issues with poor data quality and de-synchronisation of the systems, particularly with regard to rotating assets. Data cleansing and architecture improvements are ongoing and it is anticipated that over the next 12 months data quality will be significantly improved. In the meantime, we considered that Maximo provided a better source to report age profile data compared to GIS due to the following advantages:

- Rotating asset data was more accurate.
- Linear asset data was comparable.
- There are many asset classes in Maximo not present in the GIS.
- Using a single system allowed data to be extracted more consistently and efficiently.

Reports in the Maximo asset management system were used to extract the necessary asset specifications for each Power and Water Asset Class. These typically included fields such as installation date, capacity and voltage, though there were different requirements depending on the level of disaggregation required to achieve the repex Asset Categories.

The SCADA, Network Control and Protection categories were not sourced from Maximo, since the Maximo asset data is currently not reflective of the true state of these assets. These were produced manually based on staff knowledge in the SCADA and Communications team together with internal spreadsheets that are used for ongoing management of the assets, and project documentation from the records management system.

The Buildings and Civil and Grounds categories were also not sourced from Maximo, due to issues with the data quality for these assets. The data source used for these was the RAB asset value datasheet.

Where critical data was missing, we manually updated information using sources such as field inspection results, maintenance sheets and test reports. If the actual value was not able to be located, we estimated the value based on similar assets and engineering judgement.

The asset age was difficult to determine in many cases due to inconsistency in the way installation and commissioning dates have been recorded historically. There are also many instances of asset replacements occurring without being updated in the system until many years later when asset details were obtained from audits. In these cases the installation dates were never recorded or updated.

Accordingly, we decided to use the year of manufacture as a proxy for the installation date. This value is typically stamped on asset nameplates and has been recorded during recent asset inspections, and so is considered the most accurate proxy for installation date.

It could also be argued that the year of manufacture is the appropriate date to use when analysing asset life since assets will begin to deteriorate immediately upon manufacture and are rarely more than superficially refurbished before being re-deployed. Where the year of manufacture was not available the installation and commissioning dates were used in respective order of precedence. If no dates were available for an asset, then the date was left as unknown.

There are also many distribution assets that have an installation date of 1 January 1975, coinciding with the year Cyclone Tracy occurred. It is apparent from the abnormally high quantity of these assets that this was caused by a bulk update in the asset data system at the time. It is expected that these assets were thought to be "Cyclone Tracy era" in 1974 and thus all given a nominal date of around that time. The process of assigning dates to these assets and assets with unknown dates is discussed below.

Once the data was cleansed and each asset categorised, the quantity of installed assets could be populated by simply counting the number of assets (or summing the length of each asset for linear assets - cables, conductors, communications linear assets and cable tunnels) of each Asset Category for each year of interest.

Some Asset Categories contained multiple Power and Water Asset Classes, so the final quantity is the sum of the quantities for each Asset Class. It should be noted that only assets with Entity code "21" were considered in the analysis as this code identifies assets within the regulated network. The table below shows the link between the REPEX Asset Group/Category and the Power and Water Asset class.

The quantity of assets with unknown dates in each Asset Category was then calculated, and these were allocated to each year in proportion to assets from same category with known dates. There was no systematic way to predict the likely age of assets with unknown installation dates, therefore allocating in proportion with the known asset fleet was a reasonable method.

The assets with installation year of 1974-75 were then addressed by "smoothing" that year's quantity across an adjacent year range as outlined below.

Asset Class	Year Range
Distribution Poles	1960-61 to 1989-90
Conductors	1960-61 to 1989-90
Pole Transformers	1960-61 to 1989-90
Cables	1970-71 to 1989-90
Ground / Kiosk Transformers	1970-71 to 1989-90
Services	1970-71 to 1989-90
Switchgear	1960-61 to 1989-90
Pillars	1970-71 to 1989-90

The date range was chosen to represent the likelihood of assets being installed in that period. For example, cables and kiosk transformers only began to be installed in large proportions in the 1970s whereas conductors and pole transformers have been around for much longer.

Finally, to correct any rounding errors resulting from the above manipulations, the total quantity of assets was corrected to its original value by adding or subtracting from the year with the most assets installed.

The asset quantities for SCADA, Network Control and Protection were calculated manually and entered directly into the Asset Age Profile workbook.

Asset Age Profile - Economic Life - Mean

It is difficult to accurately determine the mean asset life of Power and Water assets. This is partly because the majority of the network was only established over the last 40 years, which is less than the expected life of most assets.

The other contributing factor is the limited historical failure data we can analyse. Only since the introduction of the Maximo asset management system in 2012-13 have asset failures and

rotations been recorded in any meaningful way, and this process is still being embedded and improved over time.

Prior to Maximo, when an asset was replaced it simply had its installation date updated to the replacement date and the history of the previous asset was lost. This means that the age of assets for replacement have not been recorded for the bulk of historic asset replacements in our network. For this reason, we decided to use the Power and Water financial life of the asset as the mean economic life.

The Power and Water financial lives were derived from an Asset Valuation Report produced by SKM in 2013. This report produced a set of financial lives for all Power and Water network assets, based on NSW Treasury guidelines, SKM engineering judgement and Power and Water experience. The resulting financial lives have been used since 2013 to capitalise and depreciate Power and Water network assets.

We note that the Power and Water financial lives are not used to drive the replacement forecasts in the regulatory proposal. For asset classes suited to a replacement modelling approach (typically distribution assets with high volumes and replacement rates), a pooled asset replacement forecast model was used which takes into account historical failures and unit costs. For other asset classes, replacement forecasts are driven by asset condition.

The Switchgear " 11 kV & < = 22 kV ; Circuit Breaker" asset categories comprise Power and Water Asset Classes with different financial lives - distribution switchgear (35 years) and zone substation circuit breakers (45 years). In this case, the zone substation circuit breaker life has been used since they comprise the vast majority of the assets.

Asset Age Profile - Economic Life - Standard Deviation

As described above, there is insufficient data to determine the actual standard deviation from actual data, so the standard deviation was estimated by taking the square root of the mean, which is a reasonable mathematical method in the absence of any clear evidence based data.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
7.1 (a) Where PWC provides asset sub-categories corresponding to the prescribed asset categories in table 5.2.1, PWC must ensure that the expenditure and asset replacement / asset failure volumes of these sub-categories reconcile to the higher level asset category. PWC is required to use the additional rows and provide a clear indication of the asset category applicable to each new sub-category in the yellow input cells labelled 'OTHER BY DNSP DEFINED'	This is not applicable as the asset-subcategories provided are independent of the high-level asset category (apart from refurbishments which are addressed below).
7.1 (b) Any new asset categories defined by PWC in table 5.2.1 of regulatory template 5.2 must also be listed in table 2.2.1 in Workbook 3 - Category analysis, regulatory template 2.2, and PWC must provide corresponding	All asset categories defined in 5.2.1 have also been provided in template 2.2.

asset expenditure, replacement and failure metrics in accordance with the instructions for regulatory template 2.2	
7.1 (c) If in Workbook 3 - Category analysis, regulatory template 2.2, PWC has provided estimated expenditure data on the basis of historical data that has included works across asset groups PWC must provide the asset age profile data in regulatory template 5.2 against the most elementary asset category. For example, where PWC replaces pole-mounted switchgear in conjunction with a pole-top structure it must report the asset age profile data against the relevant switchgear asset category. PWC must provide documentation of instances where backcast unit costs generated have involved allocations of historical records that include expenditure across asset groups.	The data provided in template 2.2 is based on actual expenditure from the asset management systems and financial management systems which has been allocated to the specified Asset Categories.
7.1 (d) In instances where PWC is reporting expenditure associated with asset refurbishments/ life extensions capex it must use the additional rows at the bottom of the table ('OTHER BY DNSP DEFINED'). PWC must provide the required data, applying the corresponding asset group and category name followed by the word "REFURBISHED".	Refurbished assets have been included in the 'OTHER BY DNSP DEFINED' section. An age profile has been provided on the basis of the refurbishment date, not the original installation date. It should be noted that refurbished quantities have not been subtracted from the prescribed asset categories in table 5.2.1.
7.1 (e) In instances where PWC considers that	New asset categories have been defined in the
both the prescribed asset group categories and the asset sub-categorisation do not account for an asset on PWC's distribution system, PWC must use the additional rows at the bottom of the table ('OTHER BY DNSP DEFINED'). PWC must provide the required data, applying a high level descriptor of the asset as the category name.	"OTHER BY DNSP DEFINED" section.
7.1 (f) When reporting asset age profile of staked wooden poles, PWC must report by the year the pole was staked, not the year the underlying pole was installed.	This is not applicable as we do not have wooden poles.
7.1 (g) In instances where PWC wishes to provide asset sub-categories in addition to the specified asset categories in table 5.2.1, PWC must provide a weighted average asset economic life, including mean and standard deviation that reconciles to the specified asset category in accordance with the specified formula:	This is not applicable as the asset-subcategories provided are independent of the high level asset category (apart from refurbishments which are addressed above).

Template 5.4 – Maximum demand and utilisation at spatial level

Table 5.4.1 - Non-coincident & coincident maximum demand

Source of Data

The data was sourced as follows:

- Substation Rating - Network Management Plan 2015/2016 (Internal Version Network Management Plan 2013 14 to 2018 19 - January 2017 Information Update
- Maximum data was sourced from SCADA and meter data
- Weather data was sourced from Bureau of Meteorology (BOM)

Estimated or actual information

POE 50 and POE 10 weather corrected maximum demand values were calculated using actual maximum demand data and the maximum temperatures retrieved from Bureau of Meteorology website. The weather corrected maximum demand data is actual information, as the maximum temperature data from BOM website is routinely downloaded and stored in our "RM8" record keeping system.

Methodology and assumptions

Substation Ratings

The normal cyclic ratings of the transformers at the Subtransmission Substations and Zone Substations were used as the Substation ratings unless other limitations (ie circuit breaker rating) were the limiting factor. The Normal Cyclic rating is the maximum permissible peak daily loading for the given load cycle that a transformer can supply under normal conditions each day of its life, including through wet season ambient temperature without reducing the designed life of the transformer.

Normal conditions are described as the system state where all plant is configured in its intended operational state, without planned or forced outages on any plant item. The given load cycle is the load cycle of the overall substation at which the transformer is located.

Non-coincident and coincident maximum demands

Feeder loads (in amps) are normalised by carrying out transfers for each time interval when switching and other events occurred. The transfers that occur at the feeder level are also applied at each time interval to the Zone Substation level with assumed nominal voltage to provide an MVA value. As all these calculations are carried out in MVA, the calculations of Zone Substation non-coincident and coincident maximum demands are also in MVA. The non-coincident maximum demand MW values were calculated based on the average Zone Substation power factors.

Subtransmission substation values are not normalised and the raw unadjusted MVA values were used in calculating maximum demands. MW maximum demand values were calculated based on the average Subtransmission Substation power factors.

Where only one data point (eg only MW) was available, the average lines power factor was used to calculate the missing corresponding maximum demand value required (eg MVA) and vice versa. For example, for Centre Yard, the MW was available but not MVAR or MVA and the average 66 kV power factor 0.9817 was used to calculate the MVA maximum demand.

Where neither MW or MVA values were available at the substation, the data used was in the following order of preference:

- Next level of data was used. For example: Centre Yard Substation SCADA data in was incorrect so the data from Darwin Zone Substation for the 66kV line from Darwin to Centre Yard substation was used.
- Adjacent years peak demand for a single connection point where no other data was available.

Darwin Katherine, Alice Springs and Tennant Creek systems were treated as separate systems to calculate the coincident maximum demands at Subtransmission Substation and Zone Substations. This is different to our method for the Economic Benchmarking RIN templates where we were required to treat the three isolated networks as a single system.

The three systems maximum demands were calculated based on the generation data sourced from SCADA/Meter data.

Weather Corrected maximum demands

The Northern Territory has very different weather conditions to the rest of Australia. It experiences only two seasons every year – wet season and dry season, not the traditional four seasons experienced by the other States.

There is no correlation between system demand and weather in the dry season (April to October). Therefore, weather correction is only valid in the wet season (November to March). For this reason, the maximum demand on Power and Water's networks is assumed to only occur during the wet season and Power and Water's data is based on wet season demand data.

We use weather data sourced from the following Bureau of Meteorology weather stations:

- Darwin Airport weather station for Darwin-Katherine system.
- Alice Springs Airport weather station for Alice Springs system.
- Tennant Creek Airport weather station for Tennant Creek system.

We undertake weather correction based on the difference between the daily maximum temperature for the region and the assumed POE 50% and POE 10% temperatures. This is based on studies of the correlation between temperature increase in each region and the demand increase in that same region.

For all zone substations, we undertake weather correction for each raw normalised demand value in MVA for every interval of the year. Then using the weather corrected demand values, we calculated the non-coincident and coincident MVA maximum demands consistently with the raw adjusted demand data requirement.

Weather corrected maximum demand MW values were calculated using the weather corrected MVA values and the average Subtransmission and Zone Substation power factors.

The weather correction was applied at each Subtransmission Substation interval for each raw (not normalised) demand MVA value. From these values the non-coincident and coincident MVA maximum demands were calculated. Weather corrected MW values were calculated using the weather corrected MVA values and the average power factor for that substation.

Confidential Information

There is confidential information in this template where we consider the name of a substation may provide information on a customer of ours. Further information can be found in our completed confidentiality template attached to our RIN response.

Consistency with RIN requirements

Requirement	Compliance with the requirement
Clause 9.1: PWC must enter figures in yellow- shaded cells. (a) PWC must enter figures in orange-shaded cells where it collects such information. Further instructions are provided for specific items below.	We have completed all yellow cells and orange cells where we have such data.
Clause 9.2: For the 'Winter/Summer peaking' line item, PWC is to indicate the season in which the raw maximum demand occurred by entering 'Winter' or 'Summer' as appropriate.	We have entered Winter or Summer as appropriate.
Clause 9.3: Where the seasonality of PWC maximum demand does not correspond with the form of its regulatory years, PWC must explain its basis of reporting maximum demand in the basis of preparation. For example, if PWC forecasts expenditure on a financial year basis but forecasts maximum demand on a calendar year basis because of winter maximum demand, PWC would state that it reports maximum demand on a calendar year basis and describe, for example, the months that it includes for any given regulatory year.	The time period for each reporting year is 1 April through to 31 March the following year. This is to encompass the November to March Wet Season period during which system peaks occur. This is also the period during which there is correlation between the daily system maximum demand and daily maximum temperature.
Clause 9.4: In Workbook 3 – Category analysis, regulatory template 5.4, table 5.4 PWC must input maximum demand information for the indicated network segments.	We have inputted the maximum demand information for the network segments.
(a) PWC must insert rows into the tables for each component of its network belonging to that segment. PWC must note instances where it de- commissions components of its network belonging to that segment in the basis of preparation.	No Subtransmission Substations and Zone Substations were decommissioned in 2017/2018.

Clause 9.5: Where maximum demand in MVA occurred at a different time to maximum demand in MW, PWC must enter maximum demand figures for both measures at the time maximum demand in MW occurred. In such instances, PWC must enter the maximum demand in MVA in the basis of preparation, noting the regulatory year in which it occurred.	MW values were not available at the zone substation or feeder level due to the method of normalisation. MVA values have been used to calculate all maximum demands and as such there is only a single maximum demand MVA value.
Clause 9.6: If either the MW or MVA measure is unavailable, calculate the power factor conversion as an approximation based on best engineering estimates.	Where an MVA or MW measure was missing the average Subtransmission/Zone Substation power factors were used to calculate them in Darwin Katherine, Alice Springs and Tennant Creek Systems.
Clause 9.7: If PWC cannot use raw unadjusted maximum demand as the basis for the information it provides in Workbook 3 – Category analysis, regulatory template 5.4, table 5.4.1, it must describe the methods it employs to populate those tables.	We used raw unadjusted values were used for subtransmission substations. We used raw adjusted values to calculate zone substation maximum demands.
Clause 9.8: PWC must input the rating for each element in each network segment. For Workbook 3 – Category analysis, regulatory template 5.4, table 5.4.1, rating refers to normal cyclic rating.	We entered the relevant ratings.
(a) PWC must provide the seasonal rating that corresponds to the time of the raw adjusted maximum demand. For example, PWC must provide the summer normal cyclic rating of the network segment if the raw adjusted maximum demand occurred in summer.	We entered the relevant season ratings as required.
(b) Where PWC does not keep and maintain rating information (for example, where the TNSP owns the assets to which such ratings apply), it may estimate this information.	We keep and maintain rating information and we have reported actual information in the template 5.4.
Clause 9.9: PWC must provide inputs for 'Embedded generation' if it has kept and maintained historical data for embedded generation downstream of the specified network segment and/or if it accounts for such embedded generation in its maximum demand forecast.	PWC does not keep any embedded generation historical data.
(a) PWC must allocate embedded generation figures to the appropriate element of the network segment under system normal conditions (consistent with the definition of raw adjusted maximum demand).	PWC does not keep any embedded generation historical data.
(b) PWC must describe the type of embedded generation data it has provided. For example, PWC may state that it has included scheduled, semi- scheduled and non-scheduled embedded generation in the tables for connection points. In this example, we would be able	For the reasons discussed above, we have not provided information on embedded generation, so this has no application.

to calculate native demand by adding these figures to the raw adjusted maximum demand figures.	
(c) If PWC has not kept and maintained historical data for embedded generation downstream of the specified network segment, it may estimate the historical embedded generation data.	None estimated.
Clause 9.10: PWC must provide inputs for the appropriate cells if it has calculated historical weather corrected maximum demand.	We entered relevant historical weather corrected maximum demands.
(a) PWC must describe its weather correction process in the basis of preparation. PWC must describe whether the weather corrected maximum demand figures provided are based on raw adjusted maximum demand or raw unadjusted maximum demand or another type of maximum demand figure.	We explained this under the section “Methodology and assumptions” below.
(b) Where PWC does not calculate weather corrected maximum demand it may estimate the historical weather corrected data.	We have entered the data as required.
Clause 9.11: Tables requesting system coincident data are referring to the demand at that particular point on the network (e.g. zone substations) at the time of system (or network) peak.	We entered the relevant coincident maximum demands.
(a) Conversely, non-coincident data is the maximum demand at a particular point on the network (which may not necessarily coincide with the time of system peak). For example, table 5.4.1 (on regulatory template 5.4) requests information about non-coincident raw maximum demand at zone substations. In table 5.4.1, PWC must provide information about the maximum demand at each zone substation in each year, which may not correspond to demand at the time of system peak.	We entered the relevant non - coincident maximum demands.
(b) If PWC does not record and/or maintain spatial maximum demand coincident to the system maximum demand, PWC must provide spatial maximum demand coincident to a higher network segment. PWC must specify the higher network segment to which the lower network segment is coincident to in the basis of preparation. For example, if PWC does not maintain maximum demand data for zone substations coincident to the system maximum demand, PWC may provide maximum demand data coincident to the connection point. In this example, PWC would specify the relevant connection point in the basis of preparation.	We maintain the maximum demand data at subtransmission substations and zone substations. Assumptions were demonstrated under the section “Estimated and actual information”. Where neither MW or MVA values were available at the zone substation, the higher network segment data was used. Centre Yard substation SCADA data was incorrect so the data from Darwin zone substation for the 66kV line from Darwin to Centre Yard substation is used.

Template 6.3 - Sustained interruptions to supply

Table 6.3.1 - sustained interruptions to supply

Source of Data

Outage data was sourced from the Asset Management System (Maximo). Darwin was hit by Tropical Cyclone March on the 17th March 2018. The interruptions associated with the cyclone were recorded in the Cyclone Response System (CRS) and thereafter exported into excel spreadsheet file.

The number of customers in NT was sourced from the Retail Management System (RMS) and the number of customer affected by the interruption was sourced from GIS/ESRI. For feeders and distribution substations, the customer count from GIS/ESRI was then loaded into Maximo.

Estimated or actual information

Template 3.6.1 includes both planned and unplanned outages. Unplanned outages are being reviewed monthly whereas planned interruption are not reviewed. Hence, the data on unplanned outages can be considered to be actual whereas data on planned outages is considered to be estimated.

Also, the source data on outages is contained in the Asset Management System (Maximo). Though additional processing of Maximo data was done in order to address regulatory requirements related to unplanned interruptions and to derive some additional values that are not contained in the sourced data, these additional processing was based on actual data obtained outside Maximo. Since the planned interruptions are included in all the data that is intended to address the intent of the AER requirements, the data in this templated is considered to be estimated.

Methodology and assumptions

Outage data

System operators record outages manually into Maximo in real time. The data recorded comes from various sources including SCADA, customer calls, outcome from monthly data reviews. The recorded unplanned interruptions data are reviewed monthly by both System Control and Power Networks personnel to ensure that it is as accurate as possible based on the limitations of the systems used to capture this data. Data on planned outages is not reviewed and therefore the quality of data is poorer.

For reliability reporting purposes, all the analysis is done in an excel spreadsheet file and the reliability indices (SAIDI/SAIFI) that are calculated only apply to regulated areas of the network. These indices were calculated after excluding some interruptions as described in Clause 3.3 (a) of the STPIS together with any duplicated interruptions.

There are some interruptions recorded on some assets that result in the healthy assets being interrupted. For the sake of recording all outages affecting the customer, the first interruption is recorded as the parent event and the other related interruptions are recorded as child events. If

all outages in the parent-child relationship were to be included in the reliability calculations, this would result in the reliability data being overestimated. Hence, for reliability calculations, all the parent events are excluded from those outages that are in the parent-child relationship.

Count of customers

The customer count on individual feeder was obtained from the GIS/ESRI on a quarterly basis and saved into excel spreadsheet file. These excel spreadsheet files are used as the source of the customer count on feeders and in feeder categories. The customer count on feeder categories was taken to be the average of the customer counts collated quarterly.

In most cases the outage-related data was used to provide the 'Number of customers affected by the interruption' as required in the RIN. However, in cases where these data were not provided, the customer count on an asset affected by the outage was obtained from GIS/ESRI. This was usually the case where the location that was interrupted is a switch, recloser, or pole fuses.

The customer count data collated quarterly was also used to populate customer count on locations such as switches, reclosers, and pole fuses.

Interruption Data

The spreadsheet data referred to above together with the resultant calculations of reliability indices (SAIDI/SAIFI) only apply to regulated areas of our network. These indices were calculated after excluding some interruptions as described in Clause 3.3 (a) of the STPIS. When calculating the SAIDI/SAIFI, the following events were excluded from the original dataset obtained from the outage data sources:

- Planned outages
- Generation-related outages
- Outages that were internal to customer premises
- Outages where public safety was the priority
- Cancelled outages with no failure cause code or those denoted with 'No Applicable'
- Outages in non-regulated areas of the network
- Outages where no customers were affected or where the number of customers that were affected when the event was recorded is not known
- Outages where the location of the event is not known AND there are no customer affected by the interruption
- Momentary outages that are equal to or less than one minute in duration

The data for the template was populated with the following outage-related data (recorded by System Control) that was obtained from the spreadsheet: Date of event, Time of interruption, Asset ID, Average duration of sustained customer interruption.

'Reason for interruption' data that is required in this template was populated after mapping our Low Level Failure Cause Codes to AER failure cause codes referred to ‘Reason for Interruption’.

Failure Cause Code used when recording the outage event together with comments provided by System Control when recording the outage were collectively used to identify the 'Detailed Reason for Interruption' required in this template.

Feeder Classification

In order to provide feeder classification data required in this template, data was gathered on feeder loading and feeder length. Each feeder was classified using the AER definition of feeder categories. Where no data existed for the feeder, feeder category was obtained by using the following (in order of precedence):

- The category of the new feeder that replaced the feeder that has been either decommissioned or renamed.
- The feeder category used in the ESAA surveys (same definitions as AER definition of feeder category).
- An estimate based on the category of the majority of the feeders out of the same zone substation.

Major Event Days

For the purpose of calculating the Major Event Days, the Power and Water network is divided into three systems, namely: Darwin-Katherine, Alice Springs and Tennant Creek. The MEDs were identified by using the 2.5 Beta Method described in IEEE Standard 1366 as follows:

When calculating the MEDs for 2017/18, all the days that have been identified as MEDs in the previous years together with other failure causes described in Clause 3.3(a) STPIS were excluded from the analysis before calculating the MEDs, e.g. When calculating the MEDs for 2017/18, the data analysed excluded all the days that have been identified as MEDs in the previous 5 years (2016/17- 2012/13);

The Major Event Day Thresholds (TMED) were then identified for each of the three systems - The Tennant Creek system breached the threshold limit on 29 October 2017 because of the fault that was caused by the auxiliary transformer failure. The Darwin network exceeded the MED threshold on 17 March 2018 because of Tropical Cyclone Marcus.

Any daily SAIDI value that exceeded the MED thresholds in d) was considered to be an MED and used in the AER submissions.

Power and Water Corporation systems do not have the capability of recording outages where power supply to customers may have been restored partially after an outage. Where there is a partial restoration of power supply, the outage is recorded as if the all customers were interrupted for the entire duration of the outage. This results in some SAIDI/SAIFI figures being overestimated.

It should be noted that there is some dissimilarity in some of the unplanned SAIDI and SAIFI results in table 6.3.1 due to the population distribution of the Northern Territory and the disposition of the regulated network.

As the unplanned SAIDI and SAIFI calculations in table 6.3.1 are an average of the duration of sustained interruptions for that feeder category, the results are distorted by the population bases for each feeder classification. For example, if there was in interruption in a long rural feeder and a short rural feeder, affecting ten customers in each for a period of an hour, the short rural feeder would have a SAIDI result of 0.013, whilst the long rural feeder would have a SAIDI result of 0.7 – around 50 times larger than the short rural feeder result. This is due to the fact that there are less than 900 customers attached to long rural feeders and over 45,000 customers attached to short rural feeders.

As the SAIDI and SAIFI calculations in the Economic Benchmarking RIN, schedule 3.6 'Quality of Service' for tables 3.6.1 and 3.6.2 are based on calculated using the average population of the Northern Territory, the data is not distorted in aggregate for that schedule.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with requirements
Clause 18.1: Workbook 3 - Category analysis, regulatory templates 6.3 requires the input of both planned and unplanned interruptions to supply.	This requirements has been met by providing both planned and unplanned interruptions in the template.
Clause 18.2: A sustained interruption is any loss of electricity supply to a customer associated with an outage of any part of the electricity supply network, including generation facilities and transmission networks, of more than 0.5 seconds, including outages affecting a single premises. The customer interruption starts when recorded by equipment such as SCADA or, where such equipment does not exist, at the time of the first customer call relating to the network outage. An interruption may be planned or unplanned, momentary or sustained. Does not include subsequent interruptions caused by network switching during fault finding. An interruption ends when supply is again generally available to the customer.	Customer interruption data that is used to address the intent of this requirements is recorded manually by System control personnel there are some data quality related issues when recording the events having a duration that is less than one minute. There available infrastructure is also not able to assist in recording events that are less than one minute in duration. Hence, in order to improve on the quality of data provided in the AER submissions, PWC has interpreted sustained outages as those having a duration of at least one minutes.
Clause 18.4: An unplanned event is an event that causes an interruption where the customer has not been given the required notice of the interruption or where the customer has not requested the outage.	PWC defined unplanned outages as any outage where the customer was not given at least 2 days prior.

Clause 18.5: An unplanned interruption is an interruption due to an unplanned event: a) The following events may be excluded when calculating the revenue increment or decrement under the STPIS when an interruption on the PWC's distribution network has not already occurred or is concurrently occurring at the same time: 1. load shedding due to a generation shortfall; 2. automatic load shedding due to the operation of under frequency relays following the occurrence of a power system under- frequency condition; 3. load shedding at the direction of the Australian Energy Market Operator (AEMO) or a system operator; 4. load interruptions caused by a failure of the shared transmission network; 5. load interruptions caused by a failure of transmission connection assets except where the interruptions were due to inadequate planning of transmission connections and PWC is responsible for transmission connection planning; 6. load interruptions caused by the exercise of any obligation, right or discretion imposed upon or provided for under jurisdictional electricity legislation or national electricity legislation applying to PWC	
b) An event may also be excluded where daily unplanned SAIDI for the PWC's distribution network exceeds the major event day boundary, as set out in Appendix D of the STPIS, when the event has not been excluded under clause 3.3(a).	The data provided in the AER template shows all the outages recorded in the regulated areas of the transmission and distribution network. The data are also arranged such that interruptions that should be included/excluded are clearly identified by the relevant failure cause code or the MEDs.
Clause 18.6: In completing Workbook 3 - Category analysis, regulatory templates 6.3, table 6.3.1, PWC must select a reason from the list provided for in column G. PWC may, but is not required to, select a detailed reason from the list provided for in column G (marked with orange cells).	The reason for interruption has been provided in line with the AER requirement.

Appendix A - Capex model

Power and Water has prepared a Capex model to provide data in the Category Analysis templates. In principle, this model uses project data from Power and Water's financial and asset management systems to assign capital expenditure and asset volumes to the AER's expenditure categories and service classifications. Where possible, existing Power and Water system data is mapped directly into RIN categories, however in many cases manual intervention was required to achieve the necessary disaggregation.

There are three primary data sources for the CAPEX model:

- Project expenditure data was extracted from Maximo. This dataset is a list of Power Networks' projects with expenditure by financial year, expenditure type and program
- Asset financial data, such as the installation date, quantity and cost of each asset capitalised on a project, was obtained from FMS.
- Asset technical data, such as asset class, capacity, voltage, feeder ID and location was extracted from Maximo.

The three datasets were combined to form a list of assets capitalised against each project that had expenditure during the regulatory year. The relevant project and asset technical and financial details were also included. This data set formed the basis for the detailed RIN categorisation and is found in the "Analysis" sheet in the CAPEX model.

Manual Adjustments to Capex model

In many cases, the source data had to be manually adjusted to ensure that expenditure was properly attributed to the RIN expenditure categories, correct data errors or fill in missing information. All manual adjustments have been documented in the capex model. The primary drivers of these manual adjustments are discussed below.

Repairs & Maintenance CAPEX

In many cases, expenditure that had been recorded in Maximo as Repairs and Maintenance (R&M) expenditure is considered to be augex or repex in the RIN. To address this, the instances of augex and repex being captured as R&M have been identified and classified as augex or repex for the purposes of this submission and thus included in the capex model.

Erroneous system data

There were several instances where capitalisation records appeared to be erroneous and were adjusted. For example, in some cases the costs of an entire project were capitalised on a single asset, when multiple assets had been installed.

There were also instances of dates and quantities being obviously incorrect. Where these were discovered they were corrected in the model.

Projects in progress

Many projects were in progress at the completion of the RY, or they had been completed but not yet capitalised. These projects were treated as follows:

- If they were complete at the end of the regulatory year, the relevant assets were added to the model manually and costs and quantities allocated accordingly.
- If they were incomplete at the end of the regulatory year but had significant expenditure, the assets were added manually and costs were attributed accordingly (the quantities remained zero)
- If they were incomplete at the end of the regulatory year and had insignificant expenditure, the entire project expenditure was allocated to the most appropriate category (the quantities remained zero).
- If they were incomplete at the end of the regulatory year, but we knew the assets are commissioned, the project expenditure was allocated to the most appropriate category and the quantities were manually allocated.

Non-network and Capitalised Network Overheads Allocations

Non-network expenditure, such as the purchase of tools and equipment is by default allocated to standard control services. However, the non-network assets themselves may be used across all services and in the non-regulated network. Therefore, a portion of non-network expenditure has been allocated to alternative control services and non-regulated service classes, in proportion to the direct Capex expenditure against each service class.

The same is true for the Capitalised Network Overheads expenditure, and this has been treated the same way.

High-Level Categorisation

The Power and Water technical and financial details were used to categorise each asset into the high-level RIN categories:

- Service Class
- Expenditure Category
- RAB Category
- UC Category

The categorisation used a series of mapping tables to automatically assign the values where possible. For example, the AER Service Classification was mapped using the Power and Water categories “Entity”, “Program” and “Asset Class” as seen in the table below.

AER Service Class	Work Type	Entity	Program
METERING			NME
QUOTED SERVICE		21	NRW
SCS		21	
NON-REGULATED		22	

Similarly, the AER expenditure type was mapping using the Power and Water categories "Work Type", "Work Category" and "Program" as outlined below.

AER Expenditure Category	Work Type	Project ID	Program
Balancing Item		PRD33086	
Replacement	RENEWALREPLACEMENT		Not NCC, NCA, NLS
Augmentation	EXTENSIONS, SERVICEIMPROVEMENT		Not NCC, NCA, NLS
Connection			NCC, NCA
Network Overheads			NLS
Non-network	NONSYSTEMASSETS		

The full set of mapping tables is defined in the "Mapping" worksheet. If a direct mapping was not available, or it resulted in an incorrect outcome, the values were chosen manually. These manual corrections are recorded in the capex model.

There were other high-level categorisations undertaken in the model that were not directly related to RIN requirements. The most critical of these is the Power and Water Asset Class, which aligns with the Asset Management Plans and is frequently used to assist in the detailed categorisation.

Detailed Categorisation

Once the high-level categories were assigned, further categorisation was performed in order to achieve the disaggregation required by each RIN table. For example, all assets categorised as Expenditure Category "Replacement" were required to be further categorised into one of the REPEX categories in RIN 2.2.Separate sections in the model are defined for Augmentation, Replacement, Connections and Non-Network projects, and these are discussed further in the relevant sections of this document for each.

Asset Costs

The asset capitalised cost was typically used directly as the final asset cost. However, there were instances where this was not possible. In particular, if a project had been partially capitalised the project expenditure would not reconcile to the sum of the asset costs capitalised under that project. In these instances, the asset costs were adjusted manually.

The RIN CAPEX tables typically require that expenditure be reported "as-incurred" by financial year. The CAPEX model input data has the project cost "as-incurred" by financial year, but the asset cost as a lump sum. To achieve an "as-incurred" asset cost, the project expenditure in the RY is allocated to the assets in proportion to the asset costs.

$$RY\ Asset\ Cost\ = RY\ Project\ Expenditure * \frac{Asset\ Capital\ Cost}{\sum Project\ ITD}$$

The project labour, materials and contract costs are allocated to the asset in a similar way.

Asset Quantities

The asset capitalised quantity was used directly as the final asset quantity, with the exception of any errors which were corrected as discussed in the Manual Adjustments to CAPEX Model section above.

The RIN CAPEX tables require that asset quantities be reported in the year of installation. Where possible, the installation date from the capitalisation data was used, however in some cases, particularly where the asset was upgraded (i.e. retains its original installation date) or the project had yet to be capitalised, this date was not able to be used. Therefore the asset installation year was assumed to be within the regulatory year if:

- The installation date fell within the regulatory year ; or
- The project was placed On Hold within the regulatory year ; or
- The last project work order was complete within the regulatory year.

The asset quantities were also checked against the same project in the previous submission to ensure quantities were not being double counted. Key documents include

AER Expenditure Category	Work Type
CAPEX Model	Capex Model 2017-18
TM1 Data extract	TM1 Asset Cost Extract - PN Allocation View_201881495756
FMS Data extract	20180814_oaprd2_PN_capitalised_assets
Maximo Asset Data Extract	SRQ016667 - Maximo - Data Extract - PN - PROJ
Maximo Project Expenditure Extract	SRQ016667 - Maximo - Data Extract - PN - PROJ_EXP
Previous Submission Capex Model	CAPEX Model - 16 March Submission

Appendix B - Repairs & maintenance model

The RIN requires historic repairs and maintenance expenditure information to be provided in the Category Analysis template. We have prepared an R&M model to provide the historic R&M information in the templates.

The R&M model takes input data from Power and Water's asset management system, and converts this into the volume and expenditure data as required by the various RIN tables. The AER Expenditure Categories relating to R&M are "Routine Maintenance", "Non-routine Maintenance", "Emergency Management" and "Vegetation Management". Where possible, existing Power and Water system data is mapped directly into RIN categories using defined mapping tables, however in many cases manual intervention was required to achieve the necessary disaggregation.

Maximo work order expenditure and asset technical data was used as the base for the model. The resulting dataset was a list of all Maximo work orders that had expenditure in the Regulatory Year, with relevant work order and asset details to assist with categorisation. This data set formed the basis for the detailed RIN categorisation and is found in the "Analysis" sheet in the R&M model.

Manual Adjustments to R&M model

In many cases, the source data had to be manually adjusted to ensure that expenditure was properly attributed to the RIN expenditure categories, correct data errors or fill in missing information. All manual adjustments have been documented in the R&M model. The primary drivers of these manual adjustments are discussed below.

R&M to CAPEX

In many cases, project expenditure that had been recorded in Maximo as Repairs & Maintenance is considered to be Augex or Repex in the RIN. To address this, the instances of Augex and Repex being captured as R&M have been identified and excluded from the R&M model.

R&M to ACS Fee Based

Due to an issue with the way the service request system in Maximo is configured to create work orders, the costs of ACS activities like disconnections and reconnections have been recorded as R&M expenditure in some cases. There are also work orders which have been correctly raised as R&M but were actually ACS Metering expenditure. These scenarios have been manually corrected in the model.

Other corrections

There were several other corrections to individual fields made in order to cleanse the data. All corrections are visible in the "Manual Categorisation" section of the model.

High-Level Categorisation

The Power and Water technical and financial details were used to categorise each work order into the high-level RIN categories:

- Expenditure Type
- Service Classification
- Expenditure Category

This was accomplished using mappings to automatically assign the values where possible. For example, the AER Expenditure Type was mapped directly to the Power and Water category "Resource Type".

AER Expenditure Type	Resource Type
Labour	INTERNAL LABOUR
Materials	MATERIALS PURCHASE, STORE STOCK
Contractor	SERVICES RESOURCE

The AER Service Classification was mapping using the Power and Water categories "Work Category", "Service" and "Entity".

AER Service Classification	Work Category	Service	Entity
SCS	REPAIRSMAINTENANCE	Not (ELECMTR, STRTLGHT)	21
METERING	REPAIRSMAINTENANCE	ELECMTR	21
STREETLIGHTS	REPAIRSMAINTENANCE	STRTLGHT	21
NON-REGULATED			22

Similarly, the AER Expenditure Type was mapping using the Power and Water categories "Work Type" and "Work Category" as outlined below.

AER Expenditure Category	Work Category	Work Type
Routine Maintenance	REPAIRSMAINTENANCE	PREVENTATIVEMAINT
Non-Routine Maintenance	REPAIRSMAINTENANCE	PLANNEDMAINTENANCE
Emergency Response	REPAIRSMAINTENANCE	UNPLANNEDMAINTENANCE

If a direct mapping was not available, or it resulted in an incorrect outcome, the values were chosen manually. These manual corrections are recorded in the R&M model.

There were other high-level categorisations undertaken in the model that were not directly related to RIN requirements. The most critical of these is the Asset Class, which aligns with the Asset Management Plans and is frequently used to assist in the detailed categorisation.

Detailed Categorisation

Once the high-level categories were assigned, further categorisation was performed in order to achieve the disaggregation required by each RIN table. For example, all work orders categorised as Expenditure Category "Routine Maintenance" or "Non-routine Maintenance" were required to be further categorised into one of the maintenance categories in Template 2.8. This is discussed further in the relevant sections of this document for each table.

Reconciliation

The total R&M expenditure for each financial year in the period of interest was reconciled against the trial balance. There are some outstanding differences, but these are considered immaterial and included in the balancing item in table 2.1.2.

RIN Requirements

Specific RIN and BOP requirements are discussed in the relevant section for each RIN Template.

Source documents for the model are identified below.

Information	Source
R&M Model	R&M Model 2017-18
Maximo Work Order and Asset Data Extract	SRQ016002 - Data Extract - Power Networks - List of RM Work Orders for 1718 RINs
Maximo Vegetation Contract Transactions Extract	Vegetation Management data Extract for CA RIN
Maximo Emergency Response MED Expenditure	17/18 MED Expenditure for RIN 2.9
Previous Submission R&M Model	R&M Model - TM1 Data for R&M 2012/13 to 2016/17

Appendix C - Opex Methodology

The operating expenditure reported in the RIN templates has been based on the financial accounts that were used to produce the annual Audited Statutory Accounts. Power and Water Corporation calculated the RIN opex categories in two different streams:

- Total operating expenditure was sourced from Power Network's Trial Balance.
- Repairs and maintenance work orders were also used because the Trial Balance did not contain adequate information to categorise expenditure into the RIN categories.

The repair and maintenance work order expenditure was reconciled to the Trial Balance and then the disaggregated financial data was sourced from work orders. Appendix B outlines how the repairs and maintenance expenditure was allocated to the RIN Expenditure Categories. After the repairs and maintenance expenditure was identified in the Trial Balance, the remaining expenditure in the Trial Balance was allocated to the AER categories based on the nature of each account.

Where an account in the Trial Balance was linked to a work order that was directly allocated to a RIN Service Classification and RIN Expenditure Category, we allocated it directly to the Service Classification and identified it to be 'core activity' for the Expenditure Category. This ensured the total expenditure for each Service Classification reconciled to the Audited Statutory Accounts. For standard control services the 'core activity' expenditure is equal to the sum of vegetation management, emergency response, maintenance and the balancing item expenditure. This ensures there is no double counting of costs.

The remainder of this Appendix explains how we allocated the total operating expenditure and the disaggregated repairs and maintenance expenditure into the RIN tables.

Account exclusions

The Trial Balance contains all expenditure for Power and Water for each year and is the basis for the Audited Statutory Accounts, which made it possible to determine the total expenditure on distribution services to be reported in the RIN. However, not all expense accounts relate to operating expenditure for distribution services, therefore a number of initial adjustments were made:

- All accounts that did not relate to 'Power Networks' were removed. This included removing the accounts for Water Services and the Corporate accounts. Corporate expenditure is accounted for within the Power Networks accounts as the Power Networks accounts include an allocation of Corporate expenditure.
- Assets, Liabilities and Equity related accounts were removed as they do not relate to operating expenditure. We also excluded expense accounts that did not relate to expenditure, such as bad debts and asset revaluation expenses.

Labour cost adjustments

Our accounts include labour costs in a set of accounts that for salaries and remunerations expenses. Our labour costs are also booked to repairs and maintenance and capital projects accounts. Labour recovery accounts are used to ensure our labour costs are only accounted for once.

We used the labour accounts for salaries and remuneration and the repairs and maintenance accounts to report the labour costs in the RIN. To ensure labour costs were not double counted in the RIN, we proportionately reduced the salaries and remuneration accounts by the total amount of labour booked to repairs and maintenance and capital projects.

Account classifications

We classified all accounts with each one of the six classifications as set out below

1.Service classification	2.Expenditure types	3. Cost Type	4. Expense or capital	5. Allocation type	6. P&L category	
SCS	Core Activity	Labour	Opex	Direct	Finance revenue	Impairment of non-current assets and onerous contract provisions
ACS - Metering	Non-network: IT	Materials	Capex	Indirect	Inter-group sales	Other expenses
ACS - FB	Non-network: Fleet	Contract	Corporate Costs	Exclude	Other income	Repairs and maintenance expense
ACS - QS	Non-network: Buildings and Property	Other	Exclude		Revenue from rendering of services and government grants	Net loss on disposal of property, plant and equipment, inc gifted streelights
Unregulated	Network OH	Corporate Costs			Revenue from sale of goods	Depreciation and amortisation expenses
Unallocated	Corporate OH				Employee benefits expense	

Cost allocation

The unallocated accounts were allocated to the service classifications using the proportion of the expenditure directly attributed to each service to the total expenditure directly attributed to all services.

Labour costs

The costs allocated to Power Networks from the corporate entity do not currently distinguish a cost type so the individual accounts could not be assigned to a cost type

category. So Corporate cost types were allocated based on analysis of the proportion of labour costs incurred in the corporate entity.

Capitalisation of indirect costs and unallocated costs

Before 2016-17, our Statutory Capitalisation Policy capitalised labour, invoiced contract and service costs where they directly related to capital projects but did not include indirect support costs.

In 2016-17, we extended our application of the Statutory Capitalisation Policy to include the capitalisation of an allocation of indirect support costs where they were deemed to be integral to the acquisition or construction of capital assets, provided they complied with AASB 116 Property, Plant and Equipment.

We developed an accounting treatment and methodology for the capitalisation of these indirect support costs from 2016-17, in accordance with AASB 116. The extension of our existing methodology was not considered to be a change in accounting policy by either our Board or our external auditor. As a result, there were no prior year adjustments made.

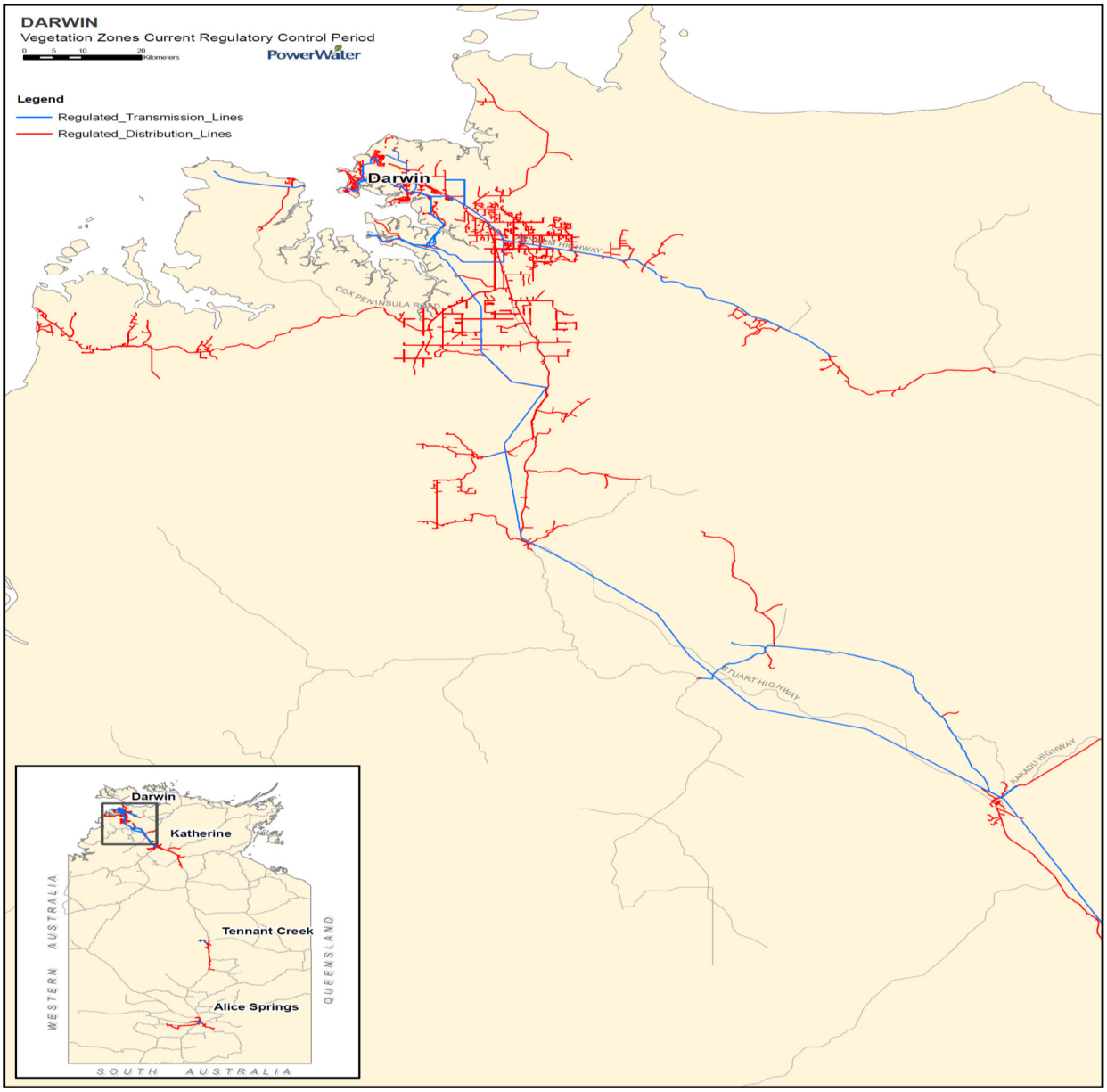
We capitalise the same corporate and network overhead accounts for regulatory purposes, but do so in proportion to the ratio of direct capex to total direct expenditure. If the ratio changes, the fraction of unallocated costs capitalised also changes. This is provided for in our CAM.

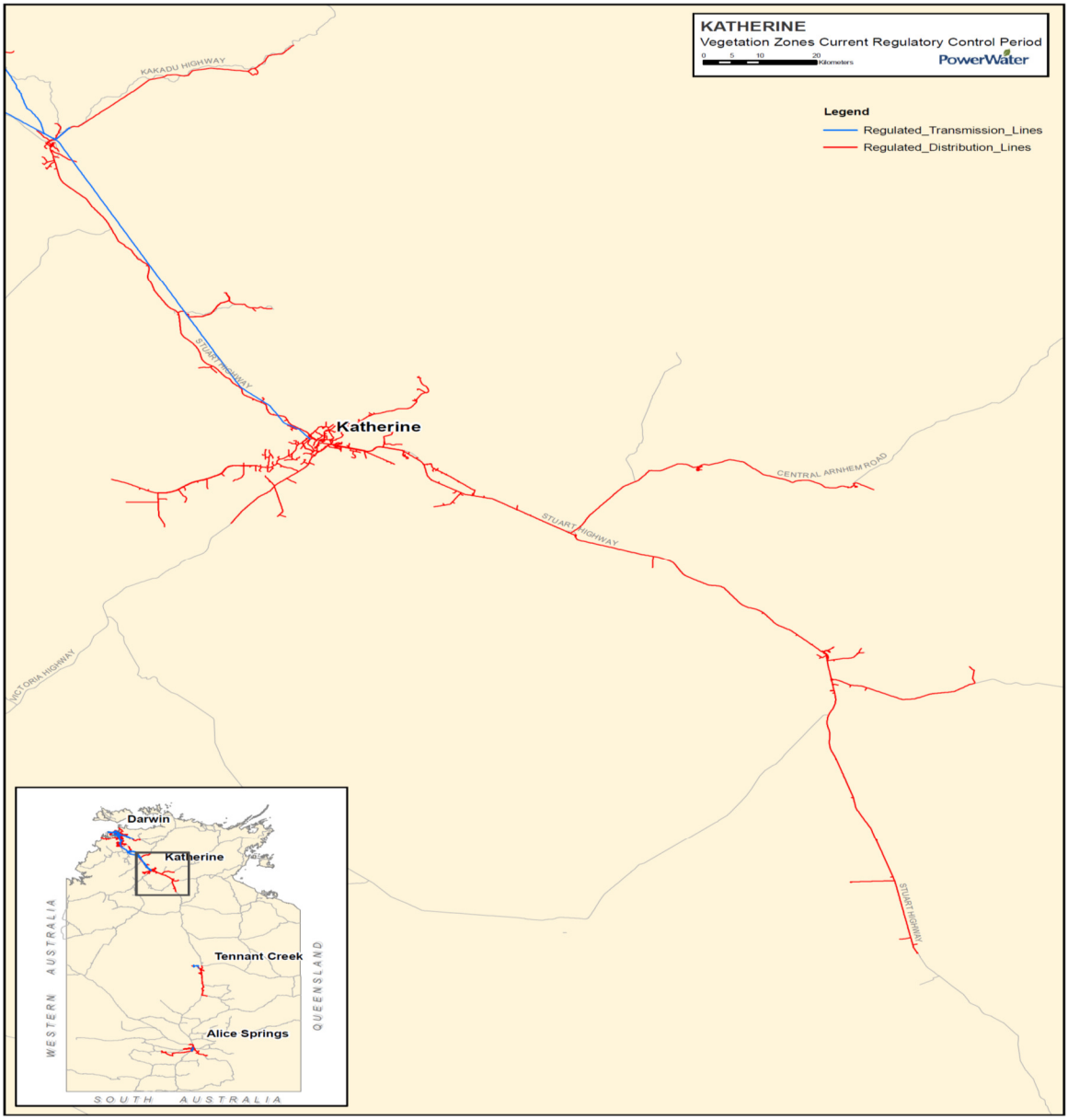
Calculating total expenditures

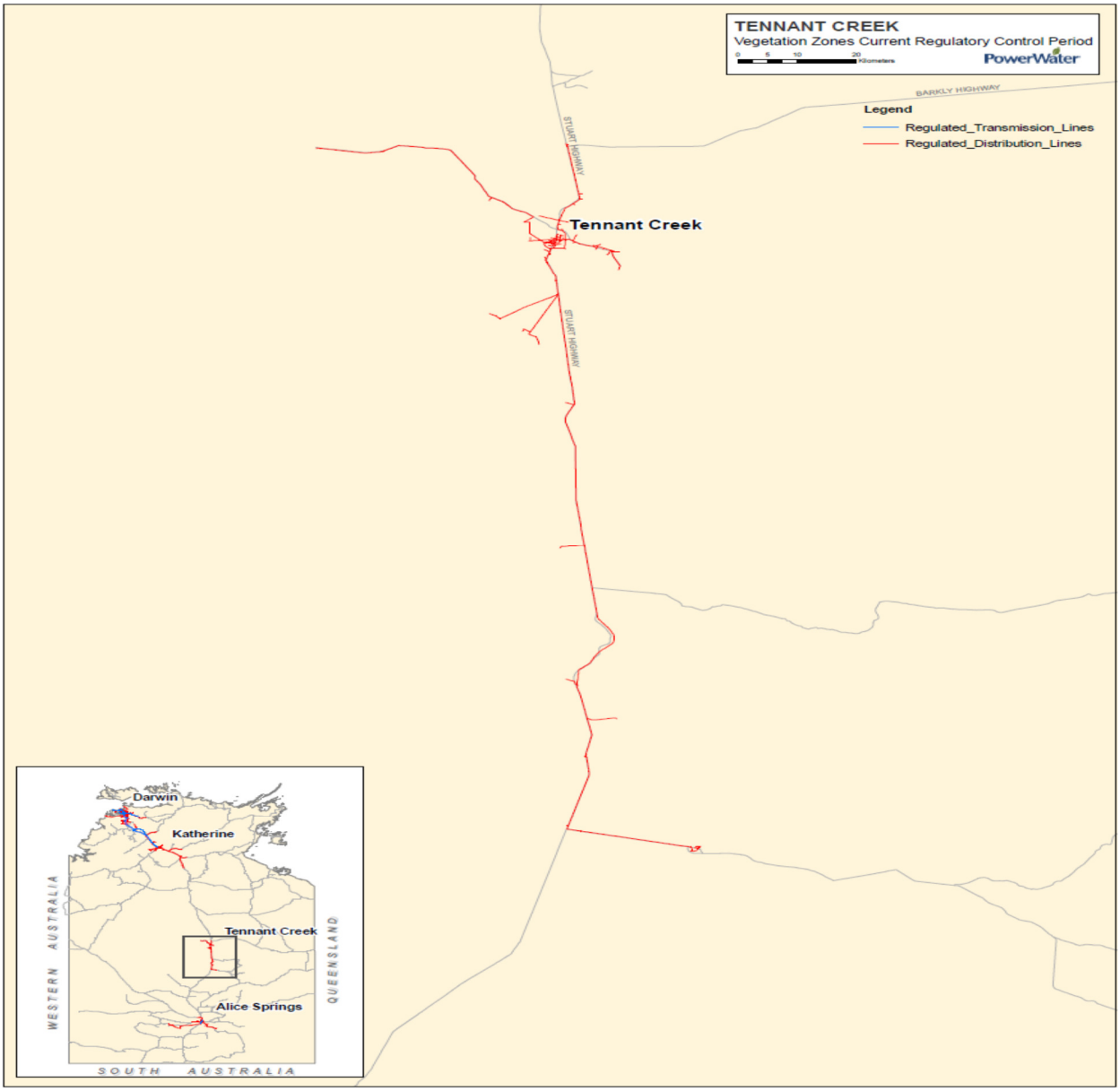
The total expenditure provided in the RIN tables is the sum of the adjusted account balances after capitalisation and overhead allocation using the relevant classifications described above.

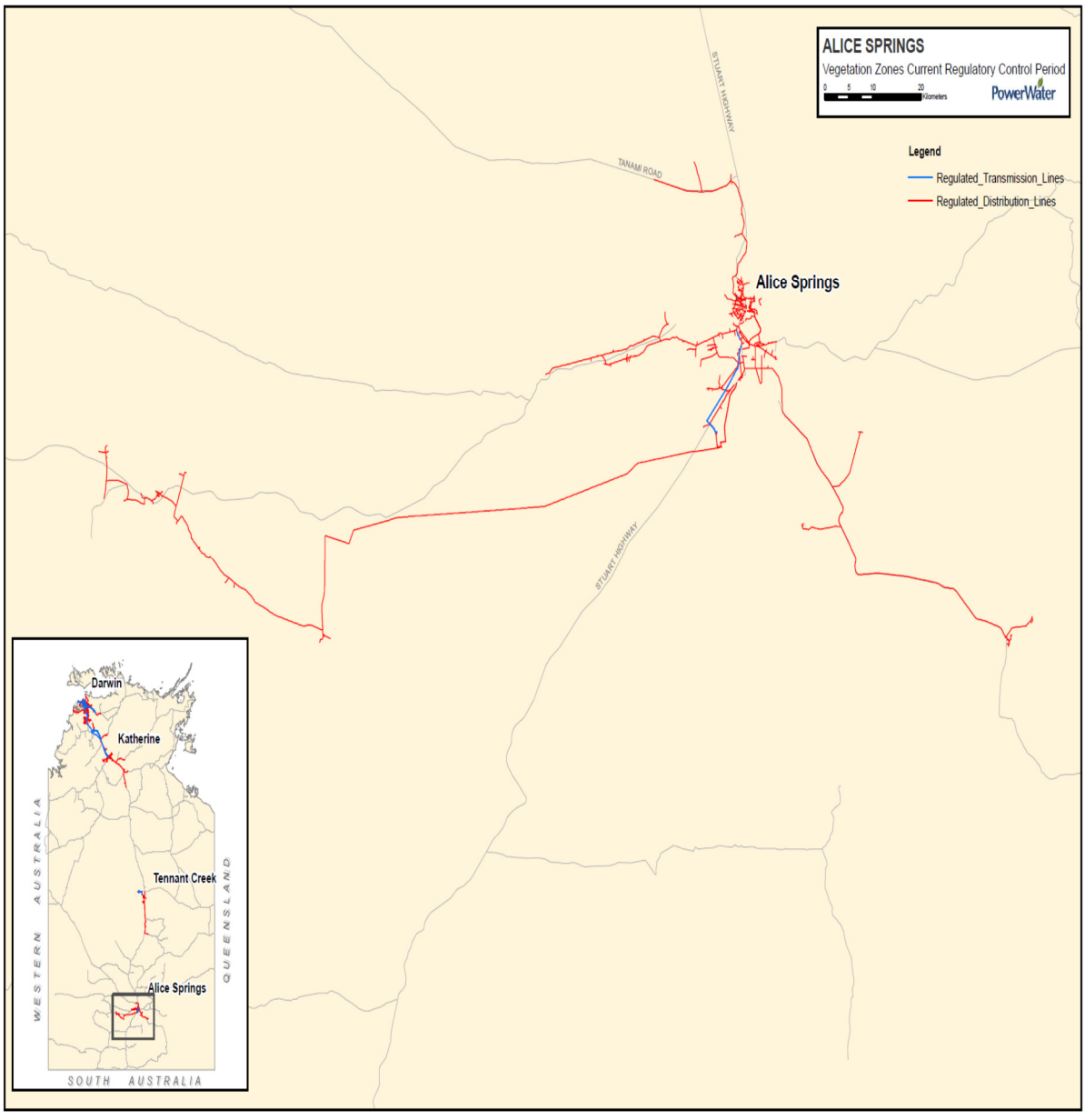
Appendix D - Vegetation Region Maps

The following maps set out the vegetation maps for Darwin, Tennant Creek, Katherine and Alice Springs.




KATHERINE
Vegetation Zones Current Regulatory Control Period
0 5 10 20 Kilometers
PowerWater
Legend
Regulated_Transmission_Lines
Regulated_Distribution_Lines
KAKADU HIGHWAY
STUART HIGHWAY
Katherine
CENTRAL ARNHEM ROAD
STUART HIGHWAY
VICTORIA HIGHWAY
STUART HIGHWAY
Darwin
Katherine
Tennant Creek
Alice Springs
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA


TENNANT CREEK
Vegetation Zones Current Regulatory Control Period
PowerWater
Legend
Regulated_Transmission_Lines
Regulated_Distribution_Lines
BARKLY HIGHWAY
STUART HIGHWAY
STUART HIGHWAY
Tennant Creek
Darwin
Katherine
Tennant Creek
Alice Springs
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA


ALICE SPRINGS
Vegetation Zones Current Regulatory Control Period
0 5 10 20 Kilometers
PowerWater
Legend
Regulated_Transmission_Lines
Regulated_Distribution_Lines
STUART HIGHWAY
TANAMI ROAD
Alice Springs
STUART HIGHWAY
Darwin
Katherine
Tennant Creek
Alice Springs
WESTERN AUSTRALIA
QUEENSLAND
SOUTH AUSTRALIA