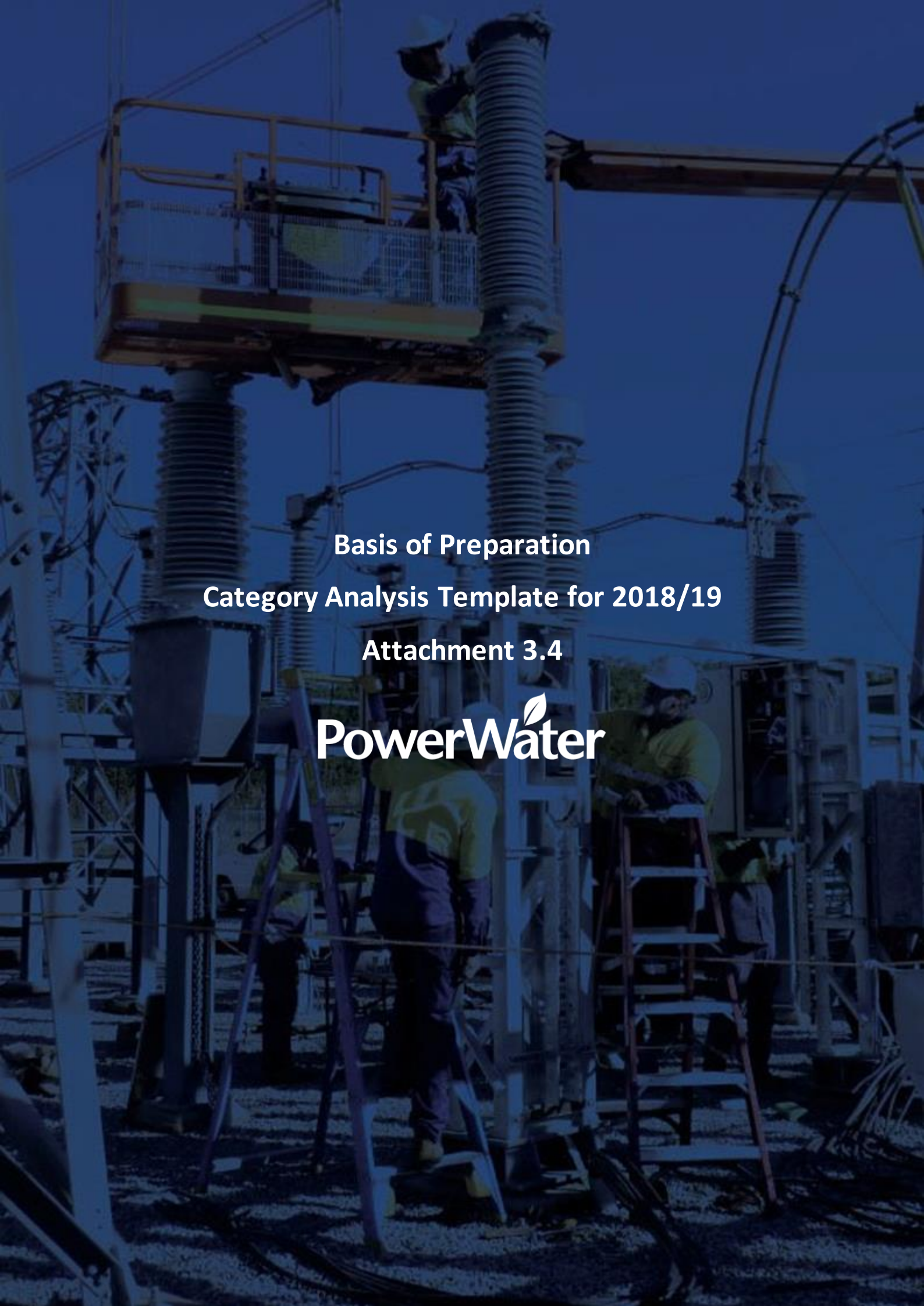

Basis of Preparation

Category Analysis Template for 2018/19

Attachment 3.4

PowerWater

Template - 2.1 Expenditure Summary

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

2.1.1 - SCS CAPEX:

For Replacement, Connections, Augmentations, and Non-network, the source of information is Maximo, FMS, and TM1 (information from these sources were used in the CAPEX model).

For both capitalised network and corporate overheads, the source of information is from the CAPEX model as noted above and the audited statutory accounts.

For metering, the source of information is from 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.

2.1.2 - SCS OPEX

For Vegetation, Maintenance, and Emergency Response, the source of information is Maximo.

For Non-network, Network overheads, and Corporate overheads, the source of information is the audited statutory accounts.

For metering, the source of information is from 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 of the amounts. If we used a different method to calculate the results in this table it is likely that we would calculate very similar results. Therefore, the RIN defines this information to be actual information.

Methodology and assumptions

Template 2.1.1 Standard Control services capital expenditure

Replacement, connections, augmentation and non-network expenditure

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.

Capitalised network and corporate overhead expenditure

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 2018-19 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 B - Calculation of operating expenditure.

Overheads are discussed in more detail in this basis of preparation in our response to template 2.6.

Metering 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.

Public Lighting expenditure

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.

Balancing item

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 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 the 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.

Capcons (included in the above)

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 2.6.

The total capcons ($m) into financial contributions and gifted assets is: Cash funding ($1.7m), Gifted assets ($3.1m), Total ($4.8m)

Template 2.1.2 - Standard control services opex

Vegetation management, maintenance and emergency response

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 C - Repairs and maintenance backcasting.

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.

Non-network, network overheads and corporate overheads

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.

Metering

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.

Public Lighting

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.

Balancing item

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 the 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.

Table 2.1.8 - Standard control services capitalised overheads

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 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 expenditure for capex must be reported on an "as-incurred" basis.	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 Requirements
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

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 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.

Appendix E Requirements	Consistency with the Requirements
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

Source of Data

We do not have any dual function assets so we have reported zero values for this table.

Estimated or actual information

Actual. We have no dual function assets.

Methodology and assumptions

We assessed whether we had dual function assets. We have no assets that meet this definition.

Confidential Information

No confidential information

Consistency with RIN requirements

Given we have no dual function assets, there are no requirements in the RIN that apply.

Table 2.1.6 - DUAL FUNCTION ASSETS OPEX

Source of Data

We do not have any dual function assets so we have reported zero values for this table.

Estimated or actual information

Actual. We have no dual function assets.

Methodology and assumptions

We assessed whether we had dual function assets. We had no assets that met the definition.

Confidential Information

There is no confidential information in the template.

Consistency with RIN requirements

Given we have no dual function assets, there are no requirements in the RIN that apply.

Table 2.1.7 - STANDARD CONTROL SERVICES CAPCONS

Source of Data

We identified two sources of capital contributions for standard control services. First, we have received financial contributions to carry out works in accordance with our capital contributions policy. Secondly, we have received gifted assets that were constructed by other parties, for which we did not incur any expenditure.

Estimated or actual information

Actual

Methodology and assumptions

We extracted the financial contributions expenditure information from the financial system and linked the transactions to capital projects as part of capex methodology described in Appendix A. The expenditure categories that applied to the relevant projects were then used to identify the expenditure category for the capital contribution amounts for each year.

In relation to gifted assets, we obtained the asset value from our fixed asset register and added the entire amount to the connections category. We did this because the only known source of gifted assets is developments relating to the connection of new customers or upgrades for existing customers.

Non-network

We are not aware of any capital contributions in the non-network category, so we reported this variable with values of zero.

Capitalised network overheads and capitalised corporate overheads

We are not aware of any capital contributions for the overheads categories, so we reported this variable with values of zero.

Metering

The metering variable has been reported with zero values as we do not have any capital contributions associated with metering services, which are classified as alternative control services.

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.

Confidential Information

There is no confidential data in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the Requirements
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.	The total capital contributions in table 2.1.7 has been reported in table 2.1.1.

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 expenditure information on replacement expenditure and 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. 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 were 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 a number of 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.

Expenditure

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.

Asset replacements

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

Asset failures

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 material in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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 subcategories 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.

Appendix E Requirements	Consistency with the Requirements
6.1 (c): In instances where PWC considers that both the prescribed asset group categories and the subcategorisation 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'. 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.	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.
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 of 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 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

Asset Replacements

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.

Assets in Commission

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 the 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

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.

Excel report produced from CAPEX backcasting with only Augmentation data as defined for Table CA 2.3.1 AUGEX ASSET DATA - SUBTRANSMISSION SUBSTATIONS, SWITCHING STATIONS AND ZONE SUBSTATIONS

Excel report produced from Maximo – 'PRD30855 - Construct Hudson Creek 132kV Switchyard Third Diameter - ITD Spreadsheet' full transaction list - to allocate costs to RIN Augex Asset Data Categories. Excel report from file 'PRD30855-HudsonCreek-AssetsFinal' for as-installed asset quantities.

Additional worksheet produced to break up and assign all major contract invoice actual costs- to allocate across RIN Augex Asset Data Categories.

All data summarized into excel working paper '2018-19 WP CA 2.3(a) - AUGEX ASSET DATA - TABLE 2.3.1 SUBTR SS AND ZSS (Material) v2 ' for copying data into RIN (Rosetta system)

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 - applies to 2.3(a) and 2.3(b)

Also refer Appendix A Capex backcasting - 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 a number of 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 2018-19 period were subject to detailed categorisation as further described.

Project type:

We classified augmentation projects as either Zone Substation, Subtransmission line projects or Other (substations operating notionally at transmission voltages) 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.

Calculations to convert nominal to real 2018-19 dollars:

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	2018-19
Nominal amount (M)	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP
Inflation	3.05%	3.55%	1.21%	2.39%	3.02%	1.51%	1.02%	1.93%	2.08%	1.59%	2.00%
Inflation index (N)	123.49%	119.83%	115.73%	114.34%	111.67%	108.40%	106.79%	105.71%	103.70%	101.59%	100%

Real 2018-19 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	M x N

Specific to Table 2.3.1:

We first identified all augmentation projects with total expenditure greater than $5m from the CAPEX Backcasting 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 2018-19. Costs for the life of the project were included. Using MS 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:

1. Average the actual labour rates applied to the project at each financial year.
2. Divide the financial year labour cost by the averaged labour rate to determine labour hours per year.
3. 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 2.3.1 variables for material projects.

Field	Methodology
Project description and changes including Project trigger(s)	Project Type selected as 'Other' as the RIN table drop down options do not suit the actual works - there was no increase to capacity or voltage change. This was a modification to a substation to improve system security.

Field	Methodology
	Project trigger selected in RIN table as 'Other' as the Business Case notes primary driver as 'Service Improvement' - this is not an option in the RIN Table drop down. 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 actual installed project quantities and also confirmed with as-measured assets created in the PWC geospatial system (ARC FM)
Plant and equipment expenditure - Transformers, Switchgear and Capacitors.	We used project transactions reports to identify procurement costs (excluding installation) for Transformers, Switchgear and Capacitors. Assessed full project transaction list to determine asset cost and categorisation costs. We then also used the major contracts lump sum price breakdown and Invoiced actuals to identify procurement costs (excluding installation) for Transformers, Switchgear and Capacitors.
Plant and equipment expenditure - other plant item	We used project transactions reports to identify other plant item costs (excluding installation). Assessed full project transaction list to determine asset cost and categorisation costs. We then also used the major contracts lump sum price breakdown and Invoiced actuals to identify procurement costs (excluding installation) other plant item costs.

Field	Methodology
Plant and equipment expenditure - installation labour	Used actual internal labour costs against the project, as well as an estimated assignment of contractor labour cost (total project contractor cost excluding equipment procurement costs)
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 -Transformers, Switchgear and Capacitors. We then used Contract Lump Sum Price Breakdown and Invoicing transactions to identify civil works expenditure within the major contracts not related to plant and equipment expenditure - Transformers, Switchgear and Capacitors. Expenditure was inputted for earthworks and yard resurfacing.
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 Zone Substation augmentation expenditure and details from the CAPEX Backcasting worksheet.
- Reviewed the project list to select only projects that were closed in 2018-19.
- Incorporated identified projects into 2017-18 RIN Augex table 2.3.1 'non-material' Working Paper (Material Projects are included in this data by default) and updated this to be the 2018-19 RIN Augex table 2.3.1 'non-material' Working Paper.
- Separated into non-material projects (expenditure) and filtered to projects closed in FY2018-19
- Reviewed the non-material projects potential to include land purchase or easement costs.
- Totaled the costs for each FY over the life of the project(s)
- Converted expenditure into real 2018-19 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.

Description of substation

For the purposes of reporting in the RIN 'PRD30855 - Construct Hudson Creek 132kV Switchyard Third Diameter' is operating at the primary voltage at the transmission level - 132kV

Relationship to other projects

The single material project reported as 'PRD30855 - Construct Hudson Creek 132kV Switchyard Third Diameter' is related to the following project:

'PRD30466 - Hudson Creek Terminal Substation - 132kV Circuit Breaker Refurbishment' - This was a project to replace the 132kV circuit breakers. Both projects were completed in parallel using common infrastructure, contractors and resources.

Project Triggers

'PRD30855 - Construct Hudson Creek 132kV Switchyard Third Diameter' Business Case primary trigger noted as 'Service Improvement' and secondary trigger noted as 'Growth / Demand'

Substation Rating

PRD30855 - Construct Hudson Creek 132kV Switchyard Third Diameter' was enabled in response to a system black event directly related to bus configuration constraints during breaker maintenance. The Normal Cyclic rating and the Emergency Rating has not increased as the number and size of Transformers has not increased. The security of the system has been increased by the addition of a 132kV bus tie. The rating has only been recorded in the 'Post' in accordance with the instructions of the Written RIN.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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), 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	We do not have any related parties, so we have reported all contract expenditure as 'All non-related party contracts'.

Appendix E Requirements	Consistency with the Requirements
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.	
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	We included all sub-transmission substation, switching station and Zone Substation projects with expenditure greater than $5 million (nominal) and project close in 2018-19 as separate rows in table 2.3.1
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 relevant 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 2018-19 in the last row of table 2.3.1

Appendix E Requirements	Consistency with the 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.	We converted nominal expenditure data to real 2018-19 expenditure data using inflation data from the Australian Bureau of Statistics. Our calculations are provided in the methodology section.
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.	For substation in PWC's network notionally operating at transmission voltages 'Other' was selected for 'Substation type' category.
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.	Each row represents data for an augmentation project for an individual substation.
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 relationship in the basis of preparation.	Where a substation augmentation project in this table is related to other projects this has been described in the basis of preparation.
Clause 8.2(g): Where PWC chooses 'Other' in a drop-down list, it must provide details in the basis of preparation.	Where 'Other' was selected in a drop-down list details are provided in the basis of preparation
Clause 8.2(h): For 'Substation ID' and 'Project ID', input PWC's identifier for the substation and project, respectively. This may be the substation/project name, location and/or code.	For 'Substation ID' and 'Project ID', PWC's identifier for the substation and project were inputted.

Appendix E Requirements	Consistency with the Requirements
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.	Primary trigger for the project chosen from the drop down list. Secondary triggers described in the basis of preparation. Where there is no primary trigger suitable in the drop down 'Other' is chosen and trigger described in the basis of preparation.
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.	Voltages entered as primary and secondary voltages xx/xx
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.	In this instance there was no change to the rating metric
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.	Only procurement costs were included for 'Total Expenditure'
Clause 8.2(m): Expenditure inputted under the 'Land and	We excluded land and easement costs

Appendix E Requirements	Consistency with the Requirements
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.	from the 'Total direct expenditure'.
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.	All equipment involved in utilising or transmitting electrical energy that are not transformers, switchgear, or capacitors have been inputted into the 'other plant item' procurement expenditure.

Table 2.3.2 - AUGEX ASSET DATA - SUBTRANSMISSION LINES

Source of Data

The information on project costs assigned to an augex driver is sourced from Maximo.

Excel report produced from CAPEX backcasting with only Augmentation data as defined for Table CA 2.3.2 AUGEX ASSET DATA - SUBTRANSMISSION LINES.

Excel report produced from Maximo – 'PRD30513 - Archer to Palmerston Line - Capitalisation - expend to date 5 June 2019 Spreadsheet' including full transaction list - to allocate costs to RIN Augex Asset Data Categories, and for as-installed asset quantities.

Additional worksheet produced to break up and assign all major contract invoice actual costs - to allocate across RIN Augex Asset Data Categories.

All data summarized into excel working paper '2018-19 WP CA 2.3(a) - AUGEX ASSET DATA - TABLE 2.3.2 SUBTRANSMISSION LINES v2' for copying data into RIN (Rosetta system)

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 - applies to 2.3(a) and 2.3(b)

Also refer Appendix A Capex backcasting - 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 a number of 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 2018-19 period were subject to detailed categorisation as further described.

Project type:

We classified augmentation projects as either Zone Substation, Subtransmission line projects or Other (substations operating notionally at transmission voltages) 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.

Calculations to convert nominal to real 2018-19 dollars:

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	2018-19
Nominal amount (M)	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP	FY EXP
Inflation	3.05%	3.55%	1.21%	2.39%	3.02%	1.51%	1.02%	1.93%	2.08%	1.59%	2.00%
Inflation index (N)	123.49%	119.83%	115.73%	114.34%	111.67%	108.40%	106.79%	105.71%	103.70%	101.59%	100%
Real 2018-19 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	M x N

Specific to Table 2.3.2:

We first identified all augmentation projects with total expenditure greater than $5m from the CAPEX Backcasting 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 2018-19. Costs for the life of the project were included. Using MS 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:

1. Average the actual labour rates applied to the project at each financial year.
2. Divide the financial year labour cost by the averaged labour rate to determine labour hours per year.
3. 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 based on approved Business Case 'Purpose' being noted primarily as Growth / Demand. Project trigger selected in RIN table as 'Demand Growth' 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 actual 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. Assessed full project transaction list to determine asset cost and categorisation costs. We then also used the major contracts lump sum price breakdown and Invoiced actuals to identify procurement costs (excluding installation) for

Field	Methodology
	poles/towers, overhead Lines, underground cables.
Plant and equipment expenditure - other plant item	We used project transactions reports to identify other plant item costs (excluding installation). Assessed full project transaction list to determine asset cost and categorisation costs. We then also used the major contracts lump sum price breakdown and Invoiced actuals to identify procurement costs (excluding installation) other plant item costs.
Plant and equipment expenditure - installation labour	Used actual internal labour costs against the project, as well as an estimated assignment of contractor labour cost (total project contractor cost excluding equipment procurement costs)
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 transactions to identify civil works expenditure within the major contracts 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

Field	Methodology
	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 lines augmentation expenditure and details from the CAPEX Backcasting worksheet.
- Reviewed the project list to select only projects that were closed in 2018-19.
- Incorporated identified projects into 2017-18 RIN Augex table 2.3.2 'non-material' Working Paper (Material Projects are included in this data by default) and updated this to be the 2018-19 RIN Augex table 2.3.2 'non-material' Working Paper.
- Separated into non-material projects (expenditure) and filtered to projects closed in FY2018-19
- Reviewed the non-material projects potential to include land purchase or easement costs.
- Totaled the costs for each FY over the life of the project(s)
- Converted expenditure into real 2018-19 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 these templates.

Relationship to other projects

The single material project reported as 'PRD30513 - Archer to Palmerston Line' was related to a subtransmission zone substation project – 'PRD30511 Palmerston ZSS Third Transformer'. The related project included design and construction of a 66kV Line bay to facilitate the inter-connection of 2 Zone substations – Palmerston ZSS and Archer ZSS. The related project has not been included in this RIN as it was not closed in the FY 2018-19.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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), 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	We do not have any related parties, so we have reported all contract expenditure as 'All non-related party contracts'.

Appendix E Requirements	Consistency with the Requirements
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.	
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 8.3(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 2018-19; and	We included sub-transmission projects with expenditure greater than $5 million (nominal) and project close in 2018-19 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	We included all sub-transmission non-material projects with expenditure less than $5 million (nominal) and project close 2018-19 in the last row of table 2.3.2.

Appendix E Requirements	Consistency with the Requirements
augmentation projects on sub-transmission lines owned and operated by PWC where project close occurred in the years 2018-19 in the last row in the table, as indicated.	
Clause 8.3(c): Record all expenditure data on a project close basis in real dollars ($2018-19). (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 2018-19 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 was for a single circuit at one voltage therefore entered in a single 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	The single material project reported as 'PRD30513 - Archer to Palmerston Line' in table 2.3.2 was related to a subtransmission zone substation project – 'PRD30511 Palmerston ZSS

Appendix E Requirements	Consistency with the Requirements
preparation.	Third Transformer'. The related project has not been included in this RIN as it was not closed in the FY 2018-19. The relationship is described in the basis of preparation.
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	We have reported the equipment procurement costs and civil works costs under the 'Total

Appendix E Requirements	Consistency with the Requirements
equipment and civil works. This must not include installation costs.	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	Only costs directly attributable to the land purchase or easement compensation payments in the 'Land purchases' and 'Easements' columns was entered.

Appendix E Requirements	Consistency with the Requirements
compensation payments.	
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.	Zone Substation and other assets involved in utilising or transmitting electrical energy that are not poles/towers (including pole top or tower structures), lines or cables have been inputted into the 'other plant item' procurement expenditure.

Template - 2.3 Augex B

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

Table 2.3.3.1 Descriptor Metrics

Table 2.3.3.2 Cost Metrics

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 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 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.	We calculated this data for high voltage feeders as described in the methodology section.
8.4 (c): Record all expenditure data on an 'as-incurred' basis in nominal dollars.	We calculated the expenditure on an as-incurred 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	We did not include costs relating to land purchases or easements.

Appendix E Requirements	Consistency with the Requirements
augmentation works on all HV feeders owned and operated by PWC must be inputted in table 2.3.4.	

Table 2.3.4 - AUGEX DATA - TOTAL EXPENDITURE

Table 2.3.5 - AUGEX BY DRIVER

Table 2.3.6 - AUGEX - GREENFIELDS DRIVER

Source of Data

The information in tables 2.3.4, 2.3.5 and 2.3.6 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 Requirements
8.5 (a): Complete the tables by inputting the required details for: (i) the rows that summarise all augmentation	Details have been entered as instructed.

Appendix E Requirements	Consistency with the Requirements
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.	
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 a number of 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 & 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.

It was found that there was inconsistency in the way that work orders had been 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 domestic PV connections are almost always done as an upgrade to an existing

connection. There were five solar power station connection projects in progress at the end of the financial year, however as none were completed these were recorded as expenditure only and not recorded in the connection quantities. 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 complains

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 the 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	Customer contributions have not been subtracted from the expenditures in tables 2.5.1 and 2.5.2

Appendix E Requirements	Consistency with the Requirements
analysis workbook, regulatory template 2.5, 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	Projects have been given expenditure categories which are mutually exclusive. That is we did not categorised projects as both connections and

Appendix E Requirements	Consistency with the Requirements
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.	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 an internal financial system (Maximo). However, there was no systemised way to determine whether a connection or a connections project relates to Residential, subdivision etc. 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.

For example, the expenditure per year for RESIDENTIAL Simple Connection LV was calculated using the following field values:

- Service Classification = "SCS"
- Expenditure Category = "Connections"
- Subcategory = "RESIDENTIAL"
- Connection Classification = "Simple connection LV"

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 in (1) was obtained by extracting all contributions in the period of interest from the financial system, and linking these to actual projects in the CAPEX Backcasting 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 (2) 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 the 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	Customer contributions have not been

Appendix E Requirements	Consistency with the Requirements
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.	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, and table 2.5.2 that records standard control services connections expenditure by connection type for the relevant regulatory year.	Standard control services expenditure has been included as instructed in the EXPENDITURE - STANDARD CONTROL SERVICES table.

Appendix E Requirements	Consistency with the Requirements
10.11 PWC must report information on connections cost metrics in Category analysis workbook, regulatory template 2.5, and 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 Subdivision, these are counted in their respective category, Residential, Commercial/Industrial, and 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. Subcategorisation 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 (greater 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 the 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	Projects have been given expenditure categories which are mutually exclusive. That is, we did not categorised projects as both connections and

Appendix E Requirements	Consistency with the Requirements
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.	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, template 2.5, table 2.5.3.	We have entered this data as required.

Template - 2.6 Non Network

Table 2.6.1 - NON-NETWORK EXPENDITURE

Table 2.6.4 - INFORMATION & COMMUNICATIONS TECHNOLOGY - CAPEX BY PURPOSE

Table CAPEX

Table OPEX

Source of Data

The information we used to calculate tables 2.6.1 and 2.6.4 were 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 involved the labour recovery adjustment. This information is then disaggregated using fleet data. As a result of this methodology, the non-network opex 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 & 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 the motor vehicles expenditure, our accounts did not provide adequate information to disaggregate the expenditure information for the relevant vehicle type. However, we capture 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 backcasting methodology in appendix A to establish the non-network capex costs in table 2.6.1. Using the capex backcasting 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, and 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 tones
- 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 & 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 & 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.
- 400 MHz 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 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.

Table 2.6.2 - ANNUAL DESCRIPTOR METRICS - IT & COMMUNICATIONS EXPENDITURE

Source of Data

The information used was from our user directory and Human Resources records.

User numbers are based on e-pass logon information. E-pass (electronic passport) is the Northern Territory Government's (NTG) identity management system as well as the LAN/email/internet/VPN provisioning system. Non mobile device numbers are based on the Dept of Corporate Service (DCIS) billing report. Mobile devices quantities are extracted from the Alloy Navigator system. Alloy navigator is the ticketing system used by Business Systems and Information Management (BISM) to provision ICT services to Power and Water. It also includes licensing and mobile asset information.

Labour (Employee) numbers and the SCS labour percentage were sourced from the OPEX model v10.1 version.

Estimated or actual information

The data was estimated. As described above, we used a combination of reports on users and devices, together with employee numbers from template 2.11 of the Annual 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 2.11.

Our total populations of users and devices were identified for the Financial Year 2018/19.

We identified the specific entity within the corporation that corresponded with the user and device, and whether the entity provided standard control services to some degree.

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 of the closing balances of 2017/18 and 2018/19. We did not track the movement on a month by month basis.

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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.

Table 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 a number of allocations which could have been made a number of different ways and could have resulted in materially different values being reported. As a result of the assumptions, the RIN defines this information to be estimated information.

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 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	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.

Appendix E Requirements	Consistency with the Requirements
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.	

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, 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.
- 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 each 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 and 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/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.

Also spans that had been decommissioned since inspections were undertaken 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, typically no more than 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 is the number of spans that were 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 which states:

For the purposes of calculating the average number of trees per maintenance span, a tree is a perennial plant (of any species including shrubs) that is equal to or greater in height than 3 metres (measured from the ground) in the relevant reporting period; 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 this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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	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".

Appendix E Requirements	Consistency with the Requirements
reasonable estimate and consider the nature of maintenance spans in urban versus rural environments in determining reasonable sample sizes. 3. Vegetation data such as: (i) the Normalised Difference Vegetation Index (NDVI) and maps available from the Bureau of Meteorology (BOM); (ii) 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 (iii) similar data from other sources such as Geoscience Australia or commercial suppliers of satellite imagery overlaid on network GIS data records. (iv) any other data source based on expert advice. (v) 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

Information	Source
Vegetation management activity and task information (task type, location, date, etc.).	Power and Water's external contractor
Feeder attributes (length, names, category)	GIS
Vegetation Management Expenditure	Maximo (Asset Management System)

Estimated or actual information

Information	Estimated and actual information
Detailed expenditure variables	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 a number of 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:

- Contractor 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 rule

Internal expenditure: 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, around tower bases etc.

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 Backcasting 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

There is no confidential information in this table.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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	We identified hazard tree clearance

Appendix E Requirements	Consistency with the Requirements
recorded separately, include these expenditures within tree trimming expenditure.	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, and 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

The estimate is based on staff knowledge but 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:

- AS4373-2007, Pruning of Amenity Trees.
- ENA DOC 023-2009, 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 in Use in Power and Water Contracts	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 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, and 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: a. each vegetation management zone; and b. the total network area with the borders of each vegetation management zone.	The maps of the nominated zones are provided in Appendix G.
Clause 12.7: For each vegetation management zone identified, provide in the basis of preparation: a. 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

Appendix E Requirements	Consistency with the Requirements
b. a list of self-imposed standards from PWC's vegetation management program which apply to that zone; and c. 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 / 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 the fact that 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 backcasting methodology described in appendix B. The high-level categorisation includes Service Classification, Expenditure Category and Asset Class were performed as described in appendix B.

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.

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

Asset Class	Maintenance Asset Category
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	Poletop and OH line maintenance
Outdoor Disconnectors and Busbars	ZSS Other Equipment

Asset Class	Maintenance Asset Category
Pillars	Pillars
Poletops	Poletop and OH line maintenance
Power Transformers	ZSS Transformers
Protection	Protection
SCADA	SCADA
Substation Auxiliary Plant	ZSS Other Equipment
Transmission Poles and Towers	Poletop 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
- Journal entries
- Inspection work orders which cover multiple asset classes, such as zone substation inspections, feeder inspection and transmission patrols.

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

Methodology for Table 2.8.1 - Descriptor Metrics for Routine and Non-Routine Maintenance - Asset Quantity at Year End

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. The final mapping is shown in the table below.

Maintenance Asset Category	Asset Age Profile Criteria
Communications	REPEX Asset Category = "Communications Network Assets" "Communications Site Infrastructure"
Distr - CBD or Distr - Non-CBD	REPEX Asset Category = "> = 1 kV" or "> 1 kV & < = 11 kV" or "> 11 kV & < = 22 kV"
Trans - CBD or Trans - Non-CBD	REPEX Asset Category = "> 22 kV & < = 33 kV" or "> 33 kV & < = 66 kV" or "> 66 kV & < = 132 kV" or "> 132 kV"
Distr - CBD or Trans - CBD	REPEX Asset Category = "> = 1 kV" or "> 1 kV & < = 11 kV" or "> 11 kV & < = 22 kV" or "> 22 kV & < = 33 kV" or "> 33 kV & < = 66 kV" or "> 66 kV & < = 132 kV" or "> 132 kV" and Suburb = "DARWIN CITY"
Distr - Non-CBD or Trans - Non-CBD	REPEX Asset Category = "> = 1 kV" or "> 1 kV & < = 11 kV" or "> 11 kV & < = 22 kV" or "> 22 kV & < = 33 kV" or "> 33 kV & < = 66 kV" or "> 66 kV & < = 132 kV" or "> 132 kV" and Suburb != "DARWIN CITY"
Distribution Substation Property	REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > 22 kV ; < = 60 kVA ; Single Phase" or "Ground Outdoor / Indoor Chamber Mounted ; 22 kV ; > 60 kVA and < = 600 kVA ; Single Phase" or "Ground Outdoor / Indoor Chamber Mounted ; 22 kV ; > 600 kVA ; Single Phase" or "Ground Outdoor / Indoor Chamber Mounted ; 22 kV ; < = 60 kVA ; Multiple Phase" or "Ground Outdoor / Indoor Chamber Mounted ; 22 kV ; > 60 kVA AND < = 600 kVA ; Multiple Phase" or "Ground Outdoor / Indoor Chamber Mounted ; 22 kV ; > 600 kVA ; Multiple Phase" or REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; < = 15 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 15 MVA and < = 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 40 MVA" and Service = "DISTR"
Distribution Substations Earth	REPEX Asset Category = "Kiosk Mounted ; < = 22kV ; < = 60 kVA ;

Maintenance Asset Category	Asset Age Profile Criteria
Mats	Single Phase" or "Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase" or "Kiosk Mounted ; < = 22kV ; > 600 kVA ; Single Phase" or "Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase" or "Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase" or "Kiosk Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase" or REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; < = 15 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 15 MVA and < = 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 40 MVA" and Service = "DISTR"
Distribution Substations Switchgear	REPEX Asset Category = "<= 11 kV ; Fuse" or "< = 11 kV ; Switch" or "> 11 kV & < = 22 kV ; Switch" or REPEX Asset Category = "<11 kV ; Circuit Breaker" or "> 11 kV & < = 22 kV ; Circuit Breaker" and service = "DISTR"
Distribution Substations Transformers	REPEX Asset Category = "Pole Mounted ; < = 22kV ; < = 60 kVA ; Single Phase" or "Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase" or "Pole Mounted ; < = 22kV ; > 600 kVA ; Single Phase" or "Pole Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase" or "Pole Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase" or "Pole Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase" or "Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Single Phase" or "Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Single Phase" or "Kiosk Mounted ; < = 22kV ; > 600 kVA ; Single Phase" or "Kiosk Mounted ; < = 22kV ; < = 60 kVA ; Multiple Phase" or "Kiosk Mounted ; < = 22kV ; > 60 kVA and < = 600 kVA ; Multiple Phase" or "Kiosk Mounted ; < = 22kV ; > 600 kVA ; Multiple Phase"

Maintenance Asset Category	Asset Age Profile Criteria
	or REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; < = 15 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 15 MVA and < = 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 40 MVA" and Service = "DISTR"
OH asset inspections	REPEX Asset Group = "OVERHEAD CONDUCTORS"
Pillars	REPEX Asset Category = "Pillars"
Pole inspections	REPEX Asset Group = "POLES"
Poletop and OH line maintenance	REPEX Asset Group = "POLES"
Protection	REPEX Asset Category = "Field Devices - Protection"
SCADA	REPEX Asset Category = "Field Devices - SCADA" or "Master Station Assets"
Service lines	REPEX Asset Category = "< = 11 kV ; Residential ; Simple Type" or " < = 11 kV ; Commercial & Industrial ; Simple Type"
ZSS Other Equipment	REPEX Asset Category = "> 22 kV & < = 33 kV ; Switch" or "> 22 kV & < = 33 kV ; Circuit Breaker" or "> 33 kV & < = 66 kV ; Switch" or "> 33 kV & < = 66 kV ; Circuit Breaker" or "> 66 kV & < = 132 kV ; Switch" or "> 66 kV & < = 132 kV ; Circuit Breaker" or "> 132 kV ; Switch" or "> 132 kV ; Circuit Breaker" or "Instrument Transformers" or "Substation Auxiliary Plant" or REPEX Asset Category = "> = 11 kV ; Circuit Breaker" or "> 11 kV & < = 22 kV ; Circuit Breaker" and service = "ZSS"

Maintenance Asset Category	Asset Age Profile Criteria
ZSS Property	REPEX Asset Category = "Buildings"
ZSS Transformers	REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > 33 kV & < = 66 kV ; < = 15 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 33 kV & < = 66 kV ; > 15 MVA and < = 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 33 kV & < = 66 kV ; > 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 66 kV & < = 132 kV ; < = 100 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 66 kV & < = 132 kV ; > 100 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 132 kV ; < = 100 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > 132 kV ; > 100 MVA' or REPEX Asset Category = "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; < = 15 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 15 MVA and < = 40 MVA" or "Ground Outdoor / Indoor Chamber Mounted ; > = 22 kV & < = 33 kV ; > 40 MVA" and Service = "ZSS"

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.

Methodology for Table 2.8.1 - Descriptor Metrics for Routine and Non-Routine Maintenance - Asset Quantity Inspected / Maintained

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 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

Methodology for Table 2.8.2 - Cost Metrics for Routine and Non-Routine Maintenance

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"
- Maintenance Asset Category = "Pole tops and overhead lines"

- Expenditure Category = "Routine Maintenance"

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.

Table 2.8.2 - Cost Metrics for Routine and Non-Routine Maintenance - Non-Routine Maintenance

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

Confidential Information

There is no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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-	Additional lines have been added for Pillars and Communications, as these have material expenditure and unique maintenance cycles.

Appendix E Requirements	Consistency with the Requirements
financial data, for example, to disaggregate asset groups according to voltage levels or to specify inspection/ 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 ex, 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.

Appendix E Requirements	Consistency with the Requirements
13.9: For 'Asset Quantity', provide in separate columns: (a) the total number of assets (population) at the 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.	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 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

Table 2.9.1 - EMERGENCY RESPONSE EXPENDITURE (OPEX)

Source of Data

The data source for major event days is the outage dataset for 2018-19 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

General Methodology

The Emergency Response expenditures are an output of the R&M Backcasting 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.

Table 2.9.1 - Emergency Response Expenditure (Opex) - (A) Total Emergency Response Expenditure

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"

Table 2.9.1 - Method for Emergency Response Expenditure (Opex) - (B) Major Events O&M Expenditure

There was no major event days reported in template 6.3.

Table 2.9.1 - Emergency Response Expenditure (Opex) - (C) Major Event Days O&M Expenditure

There was no major event days recorded in template 6.3.

Confidential Information

There was no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the 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 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 A

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 2018-19, 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 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 backcasting methodology.

Appendix E Requirements	Consistency with the Requirements
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 backcasting 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 backcasting 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 2018-19 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 Services. This is because staff in those entities only commit part of their time to Power Services. Our allocation was based on the portion of the costs of those entities allocated to Power Services. For example, if 30% of the cost of the entity is allocated to Power Services in the financial accounts, then 30% of the FTEs are attributed to Power Services.

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 Services 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 Services (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 Services. To establish the total productive hour's 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 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 regulatory template below each classification level for which it wishes to separately report labour hire.	We have not reported labour hire separately.
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.

Appendix E Requirements	Consistency with the Requirements
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 main assumption we have made is that our contractors have the same underlying cost structure as PWC as we do not have actual contractor cost information. Other assumptions could be applied that would result in materially different values reported in the RIN. For example, we could prepare a hypothetical benchmark cost build up for each contract cost to determine the labour, materials, contract and other cost. This would be unduly burdensome and there would be no way to test whether it yields a more accurate estimate of the unknown actual costs. Therefore, our approach is our best estimate.

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. This information is considered 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 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 listed in Category analysis workbook, regulatory template 2.12.	We have only reported amounts of expenditure once. No expenditure has been double counted in this table.
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.	We have made this estimate based on the proportion of our own costs. We consider this is a best estimate as there is no other way to calculate these amounts.

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.
- Volumes for meter investigation, scheduled meter reads and special meter reads -RMS and NT planned read schedule
- Remote reading and remote configuration volumes -MV90 and RMS
- Total expenditure for metering services - Audited statutory and regulatory accounts and Maximo for CAPEX.
- Volume for meter purchase, meter replacement and new meter installation data sourced from DoForm reports.
- Volume for meter testing data sourced from PWC CT Database and DoForm reports.

Estimated or actual information

This is actual because all data has been sourced from our backend systems - RMS, MV90 and DoForms.

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. It should be noted that the regulated

and non-regulated locations are determined by the Utilities Commission Network License. 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 (i.e.: 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.
- 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.

Table 4.2.1 - 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 2019. 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 hold 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 2018-19 based on an extract of the system data as at July 2019. 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 2018-19.

In 2018-19, we are utilising NMIs as means of identifying customer installation sites. 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 2018-19 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 2018-19. 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. As for the remaining population of meters these were assigned to type 6 metering installations.

The third step was to use RMS data for 2018-19 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 of July 2019.

The final step was to use RMS data for 2018-19 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 2018-19 was available in RMS. All wholesale and generation metering is known to be three-phase CT and VT connection metering.

Table 4.2.2 - 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 subcategories in the RIN (Maximo and FMS). For this reason, we used best endeavours 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 type to map the expenditure to the most relevant RIN sub-category activity.

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 2018-19. There were two methods 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 costs for these activities are reported under each subcategory 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 replacement and new meter installations - We used reporting available from the electronic MMA system (DoForms). During the period there were 10 variations of the MMA form. A report for each variation was downloaded, irrelevant data removed and then all reports merged together. The report was cleansed of errors, anomalies investigated and corrective action taken if necessary. The report was then merged with MV90 meter population table using the meter number as a common field, this allowed for a break down into Type 2,3,4 & 6 installations.
- Special Reads and Meter Investigations for type 6 meters have been calculated based on Service Requests raised and completed. Data is obtained from RMS using BI Data Report for Service Requests (Report RET126). Water, Sewerage and unregulated SR have been removed from RIN Data set based on utility type, meter location and sequence number.
- 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 was 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.

- Scheduled meter reads - We have reported zero for Type 2 to Type 4 meters, as these are remotely read meters. The 2018-19 data for Type 6 meters is based on internal spreadsheets of planned manual meter reads during the financial year of 2018-19. The data on the planned manual reads spreadsheet is updated from reading data taken from MVRS (Multi-vendor reading system) and RMS read slips in the two NT Planner documents (Part 2;1 Jul-18 to 31 Dec-18 and Part 1; 1 Jan-19 to 30 June-19. Data has been maintained through 2018-19, read data has been split between regulatory and non-regulatory based on the read sequence number and physical location
- Meter investigations - RMS contains service requests for remotely read and non-remotely read (type 6 accumulation) 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. Type 4 and Type 6 meters are split using the sequence number for that meter type, where type 2, 3, 4 meters are allocated a series of sequences which are identified as remote read meters, and type 6 meters are allocated a sequence number which is identified in NT Planner as a manual read (accumulation meter) sequence.
- Meter testing - We used a report from the CT Meter database and DoForm report to identify meters tested during the period. The report was then merged with MV90 meter population table using the meter number as a common field, this allowed for a break down into Type 2,3,4 & 6 installations.
- 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 2018-19, 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 - Where a meter is required to be reconfigured this is done on-site. Accordingly, we have reported zero remote mete reconfigurations.

Confidential Information

There is confidential information in these templates.

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.

Table 4.2.2 - COST METRICS

Source of Data

Data	Source
Meter Remote Reading	MV 90

Estimated or actual information

While much of the underlying data is based on systems and business records, we have had to use estimation methods to provide data for remote meter reading activities. There is currently no mechanism within the existing system (MV90) to provide supporting data. PWC is currently investigating alternative data collection software. In addition, as part of the services required from future potential meter vendors is the delivery of data to PWC. This is anticipated that we will receive actual data moving forwards. It must also be noted that alternative assumptions may result in materially different outcomes.

Methodology and assumptions

Table 4.2.2 - Cost metrics

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 2018-19, 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.

Confidential Information

There is confidential information in these templates.

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 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 2018-19, 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. This billing data has been 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 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 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 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 Services 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:

1. Rotating asset data was more accurate. Linear asset data was comparable.
2. There are many asset classes in Maximo not present in the GIS.
3. 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 Asset 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" and thus all given a nominal date of around that time (Cyclone Tracy was 24-12-1974). 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 = 21 were considered in the analysis, since these represent assets within the regulated network.

The table below shows the link between the REPEX Asset Group/Category and the Power and Water Asset Class.

REPEX Asset Group / Category	Power and Water Asset Class
POLES	Asset Class = "Distribution Structures" or "Transmission Poles and Towers" Entity = 21
OVERHEAD CONDUCTORS	Asset Class = "Conductors" Type != "Service" Entity = 21
UNDERGROUND CABLES	Asset Class = "Cables" Type != "Service" Entity = 21

REPEX Asset Group / Category	Power and Water Asset Class
SERVICE LINES	Asset Class = "Cables" or "Conductors" Type = "Service" Entity = 21
TRANSFORMERS	Asset Class = "Distribution Substations" or "Power Transformers" or "Auxiliary Transformers"9 Entity = 21
SWITCHGEAR	Asset Class = "Distribution Switchgear" or "HV Circuit Breakers" or "Outdoor Disconnectors and Busbars" Entity = 21
PUBLIC LIGHTING	Not applicable, unregulated
SCADA, NETWORK CONTROL AND PROTECTION SYSTEMS	
Field Devices	Manually calculated. This is the sum of protection relays and SCADA RTUs
Local Network Wiring Assets	Manually calculated. This is the number of physical panels which house the protection relays and RTUs
Communications Network Assets	Manually calculated, consists of Microwave terminals, DWDM Systems, Multiplexors, UHF System, Telemetry Systems, Teleprotection Systems
Master Station Assets	Manually calculated - a single asset representing the Energy Management System
Communications Site Infrastructure	Manually calculated, consists of Battery Systems, Solar Systems, Shelters, Towers/Masts, Server/equipment room
Communications Linear Assets	Manually calculated, consists of fibre optic cables and pilot cables
AFLC	Not applicable, Power and Water has no AFLC

REPEX Asset Group / Category	Power and Water Asset Class
OTHER	
Buildings	Asset Class = "Building" Entity = 21
Instrument Transformers	Asset Class = "Instrument Transformers" Entity = 21
Metering Units	Asset Class = "Metering Units" Entity = 21
Pillars	Asset Class = "Pillars" Entity = 21
Substation Auxiliary Plant	Asset Class = "Battery Banks" Entity = 21
Voltage Regulators	Asset Class = "Voltage Regulators" Entity = 21
Civil and Grounds	Asset Class = "Civil and Grounds" Entity = 21
Fire Systems	Asset Class = "Fire Systems" Entity = 21
Capacitor Banks	Asset Class = "Capacitor Banks" Entity = 21
Cable Tunnels	Asset Class = "Cable Tunnels" Entity = 21
Power Transformer	Age profile is taken from the REPEX quantities in the CAPEX model.

REPEX Asset Group / Category	Power and Water Asset Class
Refurbishment	The year provided is the year the asset was refurbished, not the year of installation.
Tower Refurbishment	Age profile is taken from the REPEX quantities in the CAPEX model. The year provided is the year the asset was refurbished, not the year of installation.

This process results in a completed table of asset quantities, but only for those assets with known dates.

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. E.g. cables and kiosk transformers only began to be installed en masse 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 Asset Categories were not calculated using this process. These were calculated manually and entered directly into the Asset Age Profile workbook.

Method for Table 5.2.1 - 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. For example, 96% of cables are less than 40 years old and 99.98% are less than their financial life of 55 years.

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 ; Circuit Breaker" and "> 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.

Method for Table 5.2.1 - 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 the 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 subcategories 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	All asset categories defined in 5.2.1 have also been provided in template 2.2.

Appendix E Requirements	Consistency with the Requirements
corresponding 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 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	New asset categories have been defined in the "OTHER BY DNSP DEFINED" section.

Appendix E Requirements	Consistency with the Requirements
data, applying a high level descriptor of the asset as the category name.	
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 MD Utilisation Spatial

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
- Non-coincident maximum demand (MVA) - SCADA / Meter
- Coincident maximum demand (MVA) - SCADA / Meter
- Non-coincident maximum demand (MW) - SCADA / Meter
- Coincident maximum demand (MW) - SCADA / Meter
- Weather Corrected MD 10% POE (MVA) -SCADA / Meter / Weather data
- Weather Corrected MD 50% POE (MVA) - SCADA / Meter / Weather data
- Weather Corrected MD 10% POE (MW) -SCADA / Meter / Weather data
- Weather Corrected MD 50% POE - -SCADA / Meter / Weather data MW) SCADA

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" system.

Methodology and assumptions

Subtransmission Substation & Zone Substation

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 (i.e. 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.

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 (10% POE and 50% POE)

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 services 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.
- Tennant Creek Airport weather station for Tennant Creek system.
- Alice Springs Airport weather station for Alice Springs system.

We undertake weather correction based on the difference between the daily maximum temperature for the region/system 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 no confidential information in this template.

Consistency with RIN requirements

Appendix E Requirements	Consistency with the Requirements
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.

Appendix E Requirements	Consistency with the Requirements
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 decommissions components of its network belonging to that segment in the basis of preparation.	No Subtransmission Substations and Zone Substations were decommissioned in 2018/2019.
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 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

Appendix E Requirements	Consistency with the Requirements
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.	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.	PWC keep and maintain rating information and we have reported actual information in the template 5.4.

Appendix E Requirements	Consistency with the Requirements
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 to calculate native demand by adding these figures to the raw adjusted maximum demand figures.	None provided
(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	We explained this under the section "Methodology and assumptions" below.

Appendix E Requirements	Consistency with the Requirements
maximum demand or raw unadjusted maximum demand or another type of maximum demand figure.	
(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.	This is true. 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	Power and Water does maintain the maximum demand data at subtransmission substations and zone substations. Assumptions were demonstrated under the section “Estimated and actual information”.

Appendix E Requirements	Consistency with the Requirements
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.	

Template - 6.3 Sustained Interruptions

Table 6.3.1 - SUSTAINED INTERRUPTIONS TO SUPPLY

Source of Data

Outage data was sourced from the Asset Management System (Maximo).

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 interruptions 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 Services 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 2018/19, 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,

The Major Event Day Thresholds (TMED) were then identified for each of the three systems.

Any daily SAIDI value that exceeded the MED thresholds in d) was considered to be an MED and used in the AER submissions. For 2018-19 there were no MEDs.

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 the 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	The data provided in the AER template shows

Appendix E Requirements	Consistency with the Requirements
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	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.

Appendix E Requirements	Consistency with the Requirements
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).	
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.