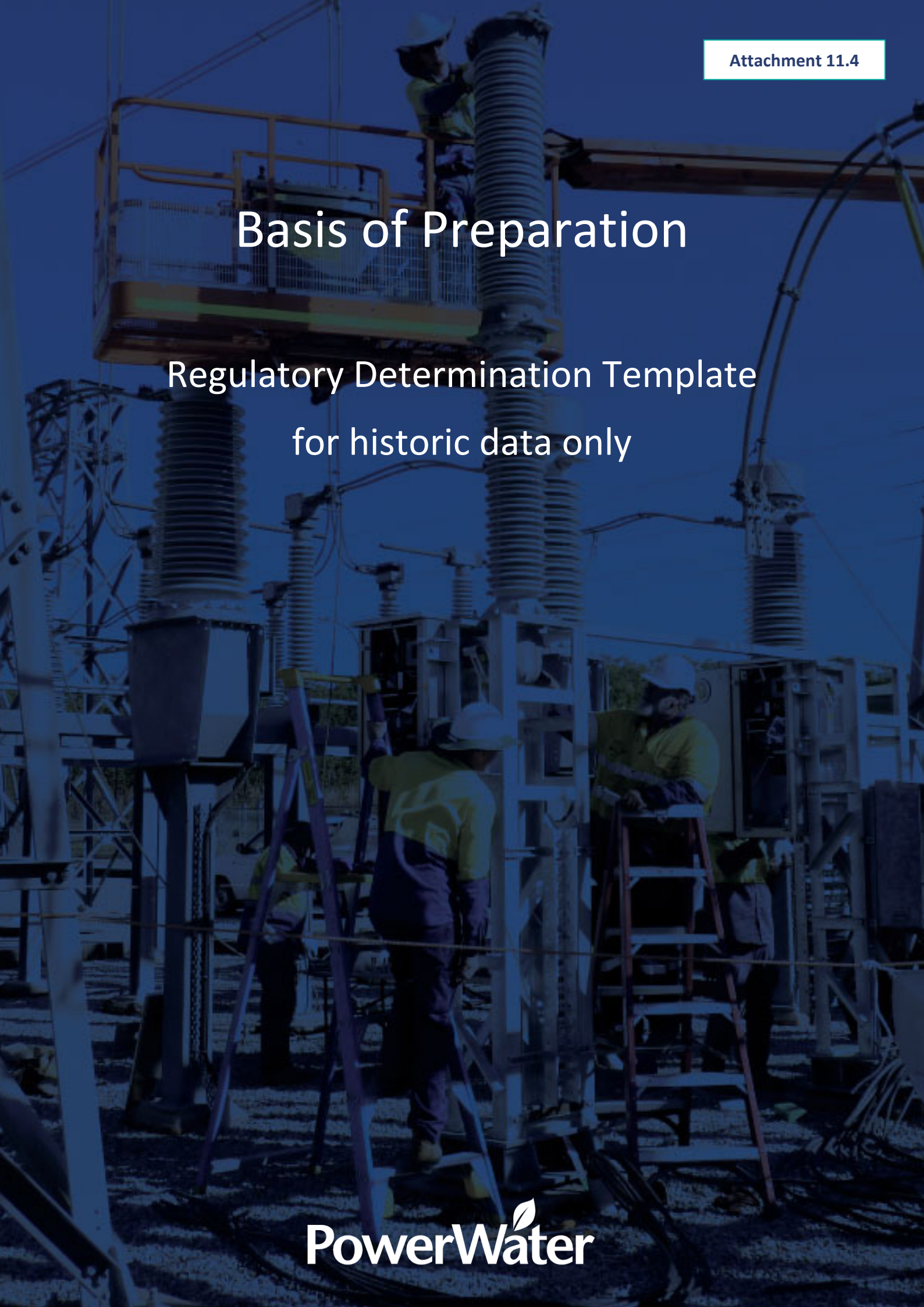
Attachment 11.4

Basis of Preparation

Regulatory Determination Template

for historic data only



PowerWater

Contents

Overview

On 9 November 2017, the Australian Energy Regulator (AER) issued Power Water Corporation (Power and Water) with a Regulatory Information Notice (RIN) under Division 4 of Part 3 of the National Electricity (Northern Territory) Law. Clause 1.3 of Schedule 1 of the RIN requires:

> *1.3 For all information, other than forecast information, provide in accordance with this notice and the instructions in Appendix E, a basis of preparation demonstrating how we have complied with this notice in respect of:*
>
> *(a) the information in each regulatory template in the Microsoft Excel Workbooks attached at Appendix A; and*
>
> *(b) any other information prepared in accordance with the requirements of this notice.*

This Basis of Preparation relates to the information provided in the regulatory template "Workbook 2 – Economic Benchmarking".

Structure

We prepared this document based on the structure of the regulatory templates. Each chapter of this document corresponds to a particular template. The sections within each chapter are used to explain the tables within each template. For all information in the template we have explained:

- how we have complied with the RIN requirements;
- the methodology and assumptions we used to calculate the information;
- whether the information we have used is estimated or actual based on the RIN definitions;
- the source of the information; and
- whether the information contains confidential information.

Limitations of our data

We expect that the AER will publish the final form of the basis of preparation and the associated data template with our information. Further, we expect that the AER and third parties will use this information for different purposes. We recommend that anyone using this information should do so at their own risk. We do not provide any warranty that this information is fit for the purpose of other parties.

We do, however, acknowledge that the information provided was collected and provided in good faith, and was based on every effort to comply with the requirements of the RIN. In doing so, we have had to estimate some data because we did not have the capability to report the information specified by the RIN.

Best estimates

We developed our best estimate in good faith, with the objective of providing the most accurate data given the RIN requirements. For all estimated information, the RIN requires

we provide reasons for why we consider the estimate to be our best estimate. In our circumstances our estimate was 'best' because:

1. we were only able to develop a single method for the majority of estimated information; and

2. the estimated information was prepared and reviewed by appropriate subject matter experts.

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

1. Template – CPI Series

1.1 Nominated CPI Series

1.1.1 Consistency with the RIN requirements

Clause 9.1 of Schedule 1 of the RIN requires:

> *Provide, in Workbook 1 – regulatory determination, regulatory template CPI, the CPI series and index used by PWC in estimating PWC's forecast capex proposal and the forecast opex proposal.*

1.1.2 Methodology and assumptions

We have primarily used 2016-17 dollars for our base costs when developing our forecast capex and opex. Therefore, we did not use CPI for historic costs. However, in some cases we escalated base unit rates or other cost data as part of our forecast. Therefore, we have included the CPI series and data that we have used throughout our regulatory proposal.

1.1.3 Estimated and actual information

The CPI information reported in years 2013-14 to 2016-17 has not been sourced from our systems or other business records. Therefore, this information is defined by the RIN as estimated information.

1.1.4 Source of the information

The CPI we have used in our regulatory models has been based on the inflation data published by the Australian Bureau of Statistics, which is the ultimate source of the data in this template.

1.1.5 Confidential information

The CPI series template does not contain confidential information.

2. Template 2.4 – Augex model

2.1 Table 2.4.1 – Augex model inputs - asset status - subtransmission lines

2.1.1 Consistency with the RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause: 2.23 (a): Complete the regulatory template by: using a new row for each sub-transmission line on PWC's network; and inputting the required details.	We have added a new row for each sub-transmission line and inputted the required details.
Clause: 2.23 (b): Each row should represent data for an individual circuit.	We can confirm that each completed row represents data for an individual circuit.
Clause: 2.23 (c): For each sub-transmission line, input maximum demand weather corrected at 50 per cent probability of exceedance. If PWC does not have maximum demand weather corrected at 50 per cent probability of exceedance, input raw adjusted maximum demand, noting such instances in the basis of preparation. (i) The historical maximum demand should reflect the demand for planning purposes, and exclude abnormal operating conditions. (ii) Forecast maximum demand growth rate must be the most realistic expectation of demand at the time of responding to the notice, which may or may not be the forecast maximum demand used in developing proposed capital or operating expenditure (iii) The forecast maximum demand growth rate should reflect the approach typically used for planning purposes.	The inputs are weather corrected 50% POE maximum demand forecasts for each sub-transmission line. (i) We sourced 2013-14 maximum demand from our Network Management Plan, which reflects the forecast we used for normal planning purposes. (ii) We have met this requirement, however we note the AER does not require forecast information to be explained in the Basis of Preparation. (iii) We have met this requirement, however we note the AER does not require forecast information to be explained in the Basis of Preparation.
Clause 2.23 (d): In the basis of preparation, explain how the maximum demand data reported in the regulatory template was prepared. Where relevant, this explanation should include: (i) How the values reported relate to the maximum demand measures that would be used for normal planning purposes. (ii) Whether the values reported are based upon measured values and, if so, where the measurement point is and how abnormal operating conditions were addressed. Whether the historical values reported are based on estimated (rather than actual measured) demand, and, if so, the basis of the estimation process and how the values were validated. (i) How the forecast growth rate was determined.	We prepared the data by using actual data reported in our Network Management Plan. This data is based on measured maximum demand for each sub-transmission line as explained in (ii) below. (i) The values we have reported in template 2.4.1 are those used for normal planning purposes. (ii) We have used actual data applying the measurement point for each subtransmission line based on half – hourly zone substation and subtransmission substation transformer maximum demands on primary side (132 or 66 kV bus). All historical values are based on actual measured data. (i) The 2013-14 maximum demand information (explained in this basis of preparation) was not based on a forecast growth rates.

Appendix E Requirements	Consistency with the RIN requirements
(ii) The relationship of the values provided to raw unadjusted maximum demand; and the relationship of the values provided to the values that could be expected from weather corrected maximum demand measures that reflect a 10 per cent probability of exceedance year.	(ii) The values provided in template 2.4.1 are not raw unadjusted values. The values are adjusted for system normal conditions removing the impact of any load transfers and weather corrected to 50% PoE. At 10% PoE, the maximum demand information would be higher than reported at 50% PoE.
Clause: 2.23 (d) In the basis of preparation, explain how the asset rating values reported in the regulatory template were determined. Where relevant, this explanation should include: (i) The basis of the calculation of the ratings reported, including asset data measured and assumptions made. (ii) How the ratings reported for the same assets may be used in augmentation planning and/or the operation of the distribution network. (iii) If alternative ratings are used in augmentation planning and/or the operation of the distribution network, explain and define these alternative ratings.	We have used normal manufacturer ratings as a basis for the reported data. (i) The line ratings in our Network Management Plan are based on normal cyclic rating of the equipment. (ii) The line ratings in the Network Management Plan are used for both planning purposes and operation purposes. (iii) We do not use alternative ratings.
2.25(d) For each sub-transmission line, input maximum demand weather corrected at 50 per cent probability of exceedance. If PWC does not have maximum demand weather corrected at 50 per cent probability of exceedance, input raw adjusted maximum demand, noting such instances in the basis of preparation.	The maximum demand information are weather corrected at 50% POE for template 2.4.1.
2.25(e) In the basis of preparation, explain how the maximum demand data reported in the regulatory template was prepared. Where relevant, this explanation should include:	We sourced Maximum demand MVA values from the Network Management Plan for 2013-2014. The MW values were calculated based on the 132kV and 66kV power factors calculated for the Economic Benchmarking Template.
2.25(f) In the basis of preparation, explain how the asset rating values reported in the regulatory template were determined. Where relevant, this explanation should include:	For overhead conductors, we calculated ratings based on 0.5m/s wind speed and 35 °C ambient temperatures. For cables, we calculated ratings based on mutual heating derating 80% for cables leaving the zone substation and subtransmission substation

2.1.2 Methodology and assumptions

Line ID

To determine Line ID, we used data in both the GIS and asset management (Maximo) systems except for the sub-transmission line identified in the following table:

Subtransmisson Line	Reason
132 MT - BA	In the GIS system, the feeder id 132 MT-BA-PK relates to the subtransmission line

Subtransmisson Line	Reason
132 BA - PK	from Manton Zone Substation to Pine Creek Subtransmission Substation (132/66 kV). Due to transmission loading and contingency analysis we have separated this into multiple lines.
66 SY - HD	In the GIS system, the feeder id 66 MR-SY related to the subtransmission line from Strangways Zone Substation to Mary River Zone Substation. Due to transmission loading and contingency analysis we have separated this into multiple lines.
66 HD - MR	
66 HD - MK	
66 MK - MR	
66 DA - CY	In the GIS system, this subtransmission line extends past the terminating Zone Substation Centre Yard.
66 PC - UR Tee	In the GIS system, the feeder id 66PC301 relates to the subtransmission line from Pine Creek Subtransmission Substation (66/11kV) to mine's Zone Substation. Due to transmission loading and contingency analysis we have separated this into multiple lines.
66 URTee - BC Tee	
66 BC Tee - CH	

Primary type of area supplied by line

We determine the subtransmission line classifications based on:

- which zone substations were supplied through the subtransmission line, and
- the direction of power flow on subtransmission lines based on a transmission load flow study with peak demand on the system.

Zone substation classifications (refer to the basis of preparation for template 2.4.3) were determined based on the feeders connected to them.

Line Voltage

We sourced line voltage values from the 2013-2014 Network Management Plan.

Originating Substation and Terminating Substation

We sourced originating substation and terminating substation names from the Network Management Plan for 2013-2014.

Route Line Length for 2013-14 values

We sourced subtransmission line route lengths in 2013-2014 from the GIS system. We estimated data in the cases identified in the table below.

Subtransmission line ID	Comments

Subtransmission line ID	Comments
66 WN - AR	We estimated the route length 19.8 km based on the following Subtransmission line route lengths. 1.) 66 HC - AR (10.1 km) 2.) 66 HC - WN (9.7 km)
66 LG - OS 1	The transmission utilisation and contingency analysis wasn't conducted for Alice Springs network in 2013/2014, so we filled the 2013/2014 values (route length, maximum demands, line ratings) as zero.
66 LG - OS 2	

Maximum Demand (weather corrected at 50% PoE values for 2013-14)

We sourced Maximum demand MVA values from the Network Management Plan for 2013-2014. The MW values were calculated based on the 132kV and 66kV power factors calculated for the Economic Benchmarking Template.

The methodology for the calculation of MVA values in the Network Management Plan 2013-14 is in "NPR1419 Annual Transmission Planning Report 2013 14".

Line ratings for 2013-14 values

We sourced line ratings from the Network Management Plan 2013-2014.

2.1.3 Estimated and actual information

As noted above, the majority of the 2013-14 data in the template 2.4.1 was obtained from the Network Management Plan and GIS, which are systems/records used for normal planning purposes. Consequently, the RIN definitions classify this as actual information.

We have made modifications to the system data in relation to:

- Applied power factors to calculate the MW maximum demand information.
- We segmented some line IDs and estimated the route length, as discussed above.

We consider that alternative assumptions on these modifications would not have resulted in materially different information, and is therefore defined by the RIN as actual information.

2.1.4 Source of the information

Information	Source
Subtransmission Line ID	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"

Information	Source
Primary type of area supplied by line (CBD, urban, long rural, or short rural)	Based on type (CBD, urban, long rural, or short rural) of Subtransmission Substations and Zone Substations connected to Subtransmission lines. Direction of power flow on Subtransmission lines based on transmission load flow study with peak demand in the system. GIS system Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)" PSSE models
Line Voltage	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
Originating Substation	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
Terminating Substation	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
Route line length as at 30 June 2014	GIS system
Maximum demand (weather corrected at 50% POE) - MVA	SCADA / Meter
Maximum demand (weather corrected at 50% POE) - MW	SCADA / Meter
Line Ratings (Thermal & N-1 emergency)	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"

2.1.5 Confidential information

Template 2.4.1 does not contain confidential information.

2.2 Template 2.4.2 – Augex Model Inputs - Asset Status - High Voltage Feeders

2.2.1 Consistency with RIN requirements

Appendix E requirements	Consistency with the RIN requirements
Clause 2.24 (a): Complete the regulatory template by: using a new row for each high voltage feeder on PWC's network; and inputting the required details.	We have added a new row for each HV Feeder and inputted the required details.
Clause 2.24 (a): Each row should represent data for an individual circuit. Each high voltage feeder must be identified by a unique ID number.	Each row represents data for an individual circuit.
Clause 2.24 (b): The high voltage feeder rating should be based upon the main trunk segment exiting the substation.	The rating is based on the main backbone of feeder as required by the AER.
Clause 2.24 (c): The maximum demand should be the demand measured at the feeder exit from the associated substation.	The maximum demand is as measured at the feeder circuit breaker as required by the AER.
Clause 2.24 (d): For each high voltage feeder, input maximum demand weather corrected at 50 per cent probability of exceedance. If PWC does not have maximum demand weather corrected at 50 per cent probability of exceedance, input raw adjusted maximum demand, noting such instances in the basis of preparation. The historical maximum demand should reflect the demand for planning purposes, and exclude abnormal operating conditions. Forecast maximum demand growth rate must be the most realistic expectation of demand at the time of responding to the notice, which may or may not be the forecast maximum demand used in developing proposed capital or operating expenditure The forecast maximum demand growth rate should reflect the approach typically used for planning purposes.	We have inputted maximum demand information based on actual values, which we have assumed to be the same as 50%, POE values. (i) Historical demand data was sourced from the 2013-14 Network Management Plan, which was used for normal planning purposes. (ii) We have met the requirement, however the AER does not require forecast information to be explained in the Basis of Preparation. (iii) We have met the requirement, however the AER does not require forecast information to be explained in the Basis of Preparation.
Clause 2.24 (e): Insert additional rows as required.	We have added a new row where required.
Clause 2.24 (f): In the basis of preparation, explain how the maximum demand data reported in the regulatory template was prepared. Where relevant, this explanation should include: How the values reported relate to the maximum demand measures that would be used for normal planning purposes. Whether the values reported are based upon measured values and, if so, where the measurement point is and how abnormal operating conditions were addressed. Whether the historical values reported are based on estimated (rather than actual measured) demand,	The maximum demand data in the Network Management Plan 2013-14 was prepared in the normal course of business for Power and Water's planning needs. The values reported in template 2.4.2 are those we use for normal planning purposes. The 2013-14 maximum demand data in the Network Management was based on measured values. The measurement point at the feeder circuit breaker with abnormal conditions (switching etc) adjusted for each half hour interval. All historic maximum demand values are sourced from Power and Water's Network Management

Appendix E requirements	Consistency with the RIN requirements
and, if so, the basis of the estimation process and how the values were validated. How the forecast growth rate was determined. The relationship of the values provided to raw unadjusted maximum demand; and the relationship of the values provided to the values that could be expected from weather corrected maximum demand measures that reflect a 10 per cent probability of exceedance year.	Plan, which is a business as usual record, kept for planning purposes. The RIN defines this information as actual information. The 2013-14 maximum demand information that is explained in this basis of preparation was not based on a forecast growth rates. The values provided in template 2.4.2 are not raw unadjusted values. They are adjusted for system normal conditions removing the impact of any load transfers. At 10% PoE, the maximum demand information would be higher than reported values but not expected to be significantly higher given the lower diversification at the feeder level.
Clause 2.24 (g): In a separate document, explain how the asset rating values reported in the regulatory template were determined. Where relevant, this explanation should include: The basis of the calculation of the ratings reported, including asset data measured and assumptions made. How the ratings reported for the same assets may be used in augmentation planning and/or the operation of the distribution network. If alternative ratings are used in augmentation planning and/or the operation of the distribution network, explain and define these alternative ratings.	The feeder rating information in the Network Management Plan 2013-14 was prepared in the normal course of business for our planning needs. The feeder ratings in our Network Management Plan are based on the manufacturer rating of the equipment. Overhead conductor ratings were calculated based on 0.5m/s wind speed and 35 °C ambient temperatures. Cable ratings were calculated based on mutual heating derating to 80% of capacity for cables leaving the Zone Substation/Subtransmission Substation The Network Management Plan is used for both planning purposes and operation purposes. (A) No alternative ratings were used for planning purposes.

2.2.2 Methodology and assumptions

Feeder Identifications

Feeder Identifications were sourced from the GIS and Asset Management (MAXIMO) systems.

High voltage feeder type (CBD, urban, short rural, or long rural)

The high voltage feeder type is determined based on MVA/Km as per AER definitions. The source data for the loading on feeders is from the Network Management Plan 2013-2014

Voltage level

We sourced the voltage levels from Network Management Plan 2013-2014.

Originating Substation

We sourced originating substation names from Network Management Plan 2013-2014.

2013-2014 Feeder route length values

We sourced 2013-2014 feeder route lengths from PSS/SINCAL models. Where there was no data available in PSS/SINCAL, the 2017 route lengths from GIS system were assumed to be the same. The following information was estimated, but we consider alternative estimation assumptions would not have resulted in materially different values:

- All spare circuit breakers, not yet commissioned circuit breakers and back fed (N-1) feeders were noted with zero route lengths.
- All cable lengths connected to auxiliary circuit breakers were assumed as 10 metres.
- All feeder lengths which were not available in PSS/SINCAL models were assumed to be the same as 2017-2018 feeder route lengths from GIS system.

Maximum demands (weather corrected at 50% POE)

We calculated Maximum demand MVA values using an assumed 1pu voltage level. We sourced the adjusted maximum demands for feeders in amps from Network Management Plan 2013-2014. The determined feeder maximum demands were assumed to be the same as 50% POE values. 2013-2014 MW values were calculated based on the 11 kV and 22 kV power factors from the table "3.4.3.5 – Power factor conversion between MVA and MW". The data is considered actual as it is sourced from the Network Management Plan 2013-2014, which is a Power and Water business record.

We note the following:

- All auxiliary breakers, spare breakers, not yet commissioned breakers and back fed (N-1) feeders are noted with zero loads. This is due to no distribution load being connected to these circuit breakers.
- 22MR303 maximum demand was zero, as the load connected to it was shut down.
- 22RG11 maximum demand was zero as the community customer was decommissioned.

Feeder Rating

Feeder ratings were sourced from the Network Management Plan 2013-2014. All auxiliary breakers, spare breakers and not yet commissioned breakers are noted with zero. This is due to there being no distribution cable or overhead conductor connected to these circuit breakers.

2.2.3 Estimated and actual information

As noted above, the majority of the 2013-14 data in the template 2.4.2 was obtained from the Network Management Plan and GIS, which are systems/records used for normal planning purposes. Consequently, the RIN definitions classify this as actual information.

Power and Water has made modifications to source data for the length of certain feeder lengths, but we consider that alternative assumptions on these modifications would not have resulted in materially different information, and is therefore defined by the RIN as actual information.

2.2.4 Source of the information

Information	Source
High voltage feeder ID	GIS system
High voltage feeder type (CBD, urban, short rural, or long rural)	SCADA / Meter / GIS system
Voltage level	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
Originating Substation	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
2013/2014 Values	
Route line length as at 30 June	PSS/SICNAL models
Maximum demand (weather corrected at 50% POE) - MVA	SCADA / Meter
Maximum demand (weather corrected at 50% POE) - MW	SCADA / Meter
Line Ratings (Thermal & N-1 emergency)	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"

2.2.5 Confidential information

Where there are single customer feeders, we have marked the information as confidential.

2.3 Template 2.4.3 – Augex Model Inputs - Asset Status - Subtransmission Substations, Subtransmission Switching Stations and Zone Substations

2.3.1 Consistency with the RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
2.27(d) For each sub-transmission substation, sub-transmission switching station and zone substation, input maximum demand weather corrected 50 per cent probability of exceedance. If PWC does not have maximum demand weather corrected at 50 per cent probability of exceedance, input raw adjusted maximum demand, noting such instances in the basis of preparation.	We have used 50 per cent POE weather corrected maximum demand data.

Appendix E Requirements	Consistency with the RIN requirements
2.27 (e) In the basis of preparation, explain how the maximum demand data reported in the regulatory template was prepared. Where relevant, this explanation should include: (i) How the values reported relate to the maximum demand measures that would be used for normal planning purposes. (ii) Whether the values reported are based upon measured values and, if so, where the measurement point is and how abnormal operating conditions were addressed.	The maximum demand data in the Network Management Plan 2013-14 was prepared in the normal course of business for Power and Water's planning needs. The values reported in template 2.4.3 are those we use for normal planning purposes. The 2013-14 maximum demand data in the Network Management was based on measured values. The measurement point was adjusted for normal conditions.
(iii) Whether the historical values reported are based on estimated (rather than actual measured) demand, and, if so, the basis of the estimation process and how the values were validated.	All historic maximum demand values are sourced from Power and Water's Network Management Plan that is a business as usual record kept for planning purposes. The RIN defines this information as actual information.
(iv) How the forecast growth rate was determined.	The 2013-14 maximum demand information that is explained in this basis of preparation was not based on a forecast growth rates.
(iv) The relationship of the values provided to raw unadjusted maximum demand; and the relationship of the values provided to the values that could be expected from weather corrected maximum demand measures that reflect a 10 per cent probability of exceedance year.	The values provided in template 2.4.3 are not raw unadjusted values. They are adjusted for system normal conditions removing the impact of any load transfers. At 10% PoE, the maximum demand information would be higher than reported values but not expected to be significantly higher given the lower diversification at the feeder level.

2.3.2 Methodology and assumptions

Substation identification

We sourced the Substation identification numbers from the GIS and Asset Management (MAXIMO) systems. The following Zone Substations were not commissioned in 2013/2014, so 2013/2014 values (number of transformers, maximum demands, and substation ratings) for the following substations were filled in as zero.

- Darwin Zone Substation was commissioned in 2015/2016. City Zone Substation was decommissioned in 2015/2016.
- Leanyer Zone Substation was commissioned in 2016/2017.
- Marrakai Zone Substation was commissioned in 2015/2016.
- Snell Street Zone Substation was replaced with Woolner Zone Substation in 2013/2014. Snell Street Zone Substation was decommissioned in 2013/2014.
- Strangways Zone Substation was commissioned in 2016/2017.
- Wishart Modular Substation was commissioned in 2015/2016.

Subtransmission Substation, Subtransmission Switching Station, or Zone Substation (STS, SSW or ZSS)

We sourced the determination of Subtransmission Substation, Subtransmission Switching Station and Zone Substations from the GIS system.

Primary type of area supplied by Substation (CBD, urban, short rural, Long rural)

The Zone Substation/Subtransmission Substation classifications were determined based on majority of type of feeders connected to Zone Substation/Subtransmission Substation and the feeder types were sourced from "2.4.2 – Augex Model Inputs – Asset Status – High Voltage Feeders".

Substation voltage (primary and secondary)

Substation voltage levels were sourced from the Network Management Plan for 2013-2014.

Maximum Demand (weather corrected at 50% POE)

We sourced the 2013-2014 maximum demand raw adjusted MVA values from Network Management Plan 2013-2014. MW values were calculated based on the 66kV line power factor 0.963 as in "3.4.3.5 – Power factor conversion between MVA and MW" in our 2006-17 - EB - historical - Template Version August 2017.

Number of transformers as at 30th June 2014

We sourced the numbers of transformers from Network Management Plan 2013-2014.

Substation rating as at 30th June 2014

We sourced substation ratings from Network Management Plan 2013-2014. The average per annum growth rates was sourced from the document "AER Report For PWC_V3".

2.3.3 Estimated and actual information

As noted above, the majority of the 2013-14 data in the template 2.4.3 was obtained from the Network Management Plan and GIS, which are systems/records used for normal planning purposes. Consequently, the RIN definitions classify this as actual information.

We modified the system data in relation to power factors to calculate the MW maximum demand information. We consider that alternative assumptions on these modifications would not have resulted in materially different information, and is therefore defined by the RIN as actual information.

2.3.4 Source of the information

Information	Source
Number of assets	GIS system and Maximo
Voltage level	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"
Maximum demand	Network Management Plan 2013-2014 – "Power and Water Corporation - Network Management Plan (2013-14 – 2018-19)"

2.3.5 Confidential information

Where there are single customer substations the information has been marked confidential.

2.4 Template 2.4.4 – Augex Model Inputs - Asset Status - Distribution Substations

2.4.1 Consistency with the RIN requirements

Appendix E Requirements	Consistency with the RIN requirements
Clause: 2.26 (a) Complete the regulatory template by: (i) inserting a row for each distribution substation category; and (ii) inputting the required details.	We added a new row for each HV Feeder and inputted the required details.
Clause: 2.26 (b) As it will be difficult to provide data for individual distribution substations, distribution substation categories should be formed that capture sets of distribution substations on PWC's network, based upon factors such as: (i) pole-mounted or ground-mounted distribution substations; (ii) distribution substation ratings; or (iii) the area types supplied (i.e., CBD, urban, rural).	We have based the distribution substation category on transformer rating.
Clause: 2.26 (c) Each distribution substation category must be identified by a unique ID number.	The unique ID is equal to the transformer rating.
Clause: 2.26 (d) Insert additional rows as required.	We have added a new row where required.
Clause: 2.26 (e) The description provided for each distribution substation category should identify characteristics such as pole-mounted or ground-mounted, range of ratings covered, area types supplied, etc.	We have identified the ratings in the description of each category.
Clause: 2.26 (f) Where actual maximum demand is not measured at individual distribution substations within a category, estimate maximum demand and utilisation based on customer types and numbers supplied from the distribution substation.	There is no maximum demand data available from distribution substations so the utilisation of each distribution substation has been estimated by allocating a diversified maximum demand for each customer type (customer type is based on land zoning).
Clause: 2.26 (g) Input specified information relating to maximum demand weather corrected at 50 per cent probability of exceedance. If PWC does not have maximum demand weather corrected at 50 per cent probability of exceedance, input specified information relating to raw adjusted maximum demand, noting such instances in the basis of preparation. (i) The historical maximum demand should reflect the demand for planning purposes, and exclude abnormal operating conditions. (ii) Forecast maximum demand growth rate must be the most realistic expectation of demand at the time of responding to the notice, which	We do not undertake weather correction on distribution substations, and therefore the values are not reported at 50% POE. There is no maximum demand data available for distribution substations so the utilisation of each distribution substation has been estimated. The historical maximum demand values have been estimated specifically for the RIN template, and did not reflect the approach we used for planning in 2013-14. Our planning approach relied on growth rates. We note that the basis of preparation only relates to historic data, and not forecast information

Appendix E Requirements	Consistency with the RIN requirements
may or may not be the forecast maximum demand used in developing proposed capital or operating expenditure. (iii) The forecast maximum demand growth rate should reflect the approach typically used for planning purposes.	
Clause: 2.26 (h) In the basis of preparation, explain how the maximum demand data reported in the regulatory template was prepared. Where relevant, this explanation should include: (i) How the values reported relate to the maximum demand measures that would be used for normal planning purposes. (ii) Whether the values reported are based upon measured values and, if so, where the measurement point is and how abnormal operating conditions were addressed. (iii) Whether the historical values reported are based on estimated (rather than actual measured) demand, and, if so, the basis of the estimation process and how the values were validated. (iv) How the forecast growth rate was determined. (v) The relationship of the values provided to raw unadjusted maximum demand; and the relationship of the values provided to the values that could be expected from weather corrected maximum demand measures that reflect a 10 per cent probability of exceedance year.	(i) The values estimated for the templates are not used for planning purposes and as such have not been validated. (ii) and (iii) As noted in the sections below we did not have the equipment to record maximum demand on each distribution substation. For this reason we have used an estimation technique as described in the section below on "Maximum demand" in "Methodology and Assumptions". (iv) We note that the forecast growth rates do not relate to historic information so we have not reported. (v) The values provided in template 2.4.4 are not raw unadjusted values, they are estimates of diversified demands. At 10% PoE, the maximum demand information would be higher than reported values.
Clause: 2.26 (j) n the basis of preparation, explain how the asset rating values reported in the regulatory template were determined. Where relevant, this explanation should include: (i) The basis of the calculation of the ratings reported including asset data measured and assumptions made. (ii) How the ratings reported for the same assets may be used in augmentation planning and/or the operation of the distribution network. (ii)(A) If alternative ratings are used in augmentation planning and/or the operation of the distribution network, explain and define these alternative ratings.	(i) The asset rating is based on the extracted value from the GIS and Maximo systems. (ii) These ratings are used in distribution system modelling. (iii) Alternate distribution substation ratings are not used in planning or operation of the network.

2.4.2 Methodology and assumptions

Distribution Station Category Identifications

We have categorised distribution substations only by their rating. The Category identifications have been chosen to match the substation rating. E.G. Distribution Substation Category ID 10 is the category containing all 10kVA transformers.

Maximum demand data

There is no maximum demand data available from distribution substations so the utilisation of each distribution substation has been estimated. The values estimated for the templates are not used for planning purposes and as such have not been validated.

Our estimate of utilisation for each distribution substation was calculated using the following methodology:

- Allocating a diversified maximum demand for each customer type. The customer type is based on land zoning.
- Using the Geographic Information System (GIS), tracing the number and type/zoning of customers connected to each distribution substation. The summation of the diversified maximum demands for each customer type is then divided by the transformer rating to give the percentage utilisation of the substation. The rating of each distribution transformer is assumed to be the nameplate rating. Only customers connected in 2013-14 and prior were considered.
- The distribution substations are then aggregated by category and utilisation. The substation data from GIS is known to be inaccurate however there is no other data available to link customer connections to distribution substations. To correct for the known inaccuracy, scaling of the number of distribution substations for each category and percentage is applied to match the data from Category Analysis Template 5.2.1. As part of the scaling it is assumed that the transformers in the >600kVA range from Category Analysis Template 5.2.1 are no greater than 1500kVA.
- The scaled data is then used to calculate the percentages for each utilisation range.

Aggregate of normal cyclic ratings

This is the number of distribution transformers in the category multiplied by the transformer rating. Cyclic rating is assumed to be the nameplate rating of the transformer.

2.4.3 Estimated and actual information

The data on maximum demand is estimated, as defined by the AER's RIN. We do not have recorded maximum demand on each distribution substation, and do not read the data on a regular basis. As such the data has been estimated as per the methodology and assumptions. A different assumption may lead to a materially different value, and as such is defined as an estimate in the AER's RIN.

The aggregate of normal cyclic ratings of distribution substations per category is estimated as the number of transformers in Category Analysis 5.2.1 is across a range of sizes. Different

assumptions may result in materially different outcomes, and therefore the information is an estimate.

2.4.4 Source of the information

Information	Source
Number and type/ zoning of customers connected to each distribution substation	GIS
Ratings	Nameplate ratings

2.4.5 Confidential information

Where there are single customer substations the information has been marked confidential.

2.5 Template 2.4.5 – Augex model inputs – network segment data

2.5.1 Consistency with the RIN requirements

Appendix E requirements	Consistency
Clause: 2.27 (a): Complete the regulatory template by inserting a row for each network segment of PWC's distribution network and providing the required details.	We have inserted a row for each network segment of PWC's distribution network.
Clause 2.27(b): PWC must define the most appropriate network segments.	The networks segments are: • Sub-transmission lines – all • Sub-transmission substations and zone substations • High voltage feeders – all • Distribution substations – all The segments in our view best suit the augex model, and was capable of bring aligned to Power and Water's asset classes. Further information can be found in section 3.2.1 of the Nuttall Consulting report submitted by Power and Water to the AER entitled "AER augex model: Assessing the Power and Water Corporation's augex forecast".
Clause 2.27(c): Individual network segments should be defined to capture differences in the main drivers of augmentation, such as growth in maximum demand, augmentation unit costs, or utilisation thresholds.	The segments in our view best suit the augex model, and was capable of bring aligned to Power and Water's asset classes. Further information can be found in section 3.2.1 of the Nuttall Consulting report submitted by Power and Water to the AER entitled "AER augex model: Assessing the Power and Water Corporation's augex forecast".
Clause 2.27(d): In forming individual network segments, it should be considered that this data will be used for the augex model, which is intended to forecast at an aggregate level and not for specific circumstances.	We have formed the individual network segments with the intention that the data will be used for the augex model.
Clause 2.27(e): As a general guide, between 15 and 30 individual network segments should be sufficient to model the whole distribution network.	We have concluded that 4 segment groups is sufficient for Power and Water's distribution network. We have combined all HV feeders into a single HV

Appendix E requirements	Consistency
	feeder segment and all distribution substation types into a single distribution substation segment to simplify the modelling process.
Clause 2.27(f): Insert additional rows as required.	We have added a new row where required.
Clause 2.27(g):In completing the AER segment group details in the regulatory template, select the most appropriate group from the following list: (i) sub-transmission lines (ID number: 1); (ii) sub-transmission substations and sub-transmission switching stations (ID number: 2); (iii) zone substations (ID number: 3); (iv) high voltage feeders – CBD (ID number: 4); (v) high voltage feeders – urban (ID number: 5); (vi) high voltage feeders - short rural (ID number: 6); (vii) high voltage feeders - long rural (ID number: 7); (viii) distribution substations – CBD, including downstream low voltage network (ID number: 8); (ix) distribution substations – urban, including downstream low voltage network (ID number: 9); (x) distribution substations – short rural, including downstream low voltage network (ID number: 10); (xi) distribution substations – long rural, including downstream low voltage network (ID number: 11).	We have selected the most appropriate group/s for each segment.
2.27(h) In the basis of preparation, provide a definition and description of each network segment reported in the regulatory template, including details on: (i) boundaries with other connecting network segments; and (ii) the main reason why the network segment was reported as an individual network segment and not bundled with other network segments.	The capex for each network segment is generally split according to the physical boundary of the assets. Sub-transmission lines – the first span not including the landing span. Sub-transmission substations – all assets in the boundary of the substation including the landing span. For zone substations - all assets in the boundary of the substation including the landing span and the circuit breaker. High voltage feeders – the cable including the termination connecting to the circuit breakers. Distribution substations – including protection hardware.
Clause 2.27(j): In the basis of preparation, explain how the unit costs and capacity factors reported in the regulatory template were calculated for each network segment. This must cover the following: (i) The methodology, data sources, and assumptions used to derive the augmentation unit cost or capacity factor. (ii) The relationship of the parameters to actual historical augmentation projects, including the capacity added through these projects and the cost of these projects. (iii) The possibility of double-counting in the estimates	(i) The methodology used to derive the parameters is provided in section 3.2.2 and 3.3.3 of the Nuttall Consulting report submitted by Power and Water to the AER entitled “AER augex model: Assessing the Power and Water Corporation’s augex forecast”. (ii) The historical unit rate and capacity factor were calculated using the actual capex and capacity added. The forecast unit rate and capacity factor were calculated using the forecast capex and capacity added from

Appendix E requirements	Consistency
(for example, when an individual project may add capacity to multiple network segments), and the process applied to ensure that this is appropriately addressed. (iv) The process applied to verify that the augmentation unit costs and capacity factors reported are a reasonable estimate for the network segment.	Power and Water's plans. (iii) Power and Water considers that it has not double counted any capex or capacity added as they are separated into distinct network segments. (iv) The parameters for the historical and forecast periods were compared to determine whether they were reasonable. It should be noted that the unit rates and capacity factors were found to be highly dependent on the actual projects that were conducted in the respective periods.
Clause 2.27(k): In the basis of preparation, explain of how the utilisation thresholds reported in the regulatory template were calculated for each network segment. This must cover the following: (i) The methodology, data sources, and assumptions used to derive the utilisation threshold. (ii) The relationship to internal and/or external planning criteria that define when an augmentation is required. (iii) The relationship to actual historical utilisation at the time that augmentations occurred for that network segment. (iv) Views on the most appropriate probability distribution to simulate the augmentation needs of that network segment. (v) The process applied to verify that the utilisation thresholds are a reasonable estimate of the utilisation limit for the network segments.	(i) The method, data sources, and assumptions for the utilisation threshold statistics can be found in section 3.2.2 and 3.3.3 of the Nuttall Consulting report submitted by Power and Water to the AER entitled "AER augex model: Assessing the Power and Water Corporation's augex forecast". (ii) Power and Water's planning criteria is based upon Network Technical Code and Network Planning Criteria and this is the primary factor in determining the timing of the augmentation. Please see "Network Technical Code and Network Planning Criteria" (Attachment 4.2) for a more detailed understanding of how our criteria is reflected in our decisions on when to augment the network. (iii) Power and Water has used the augex model calibration to calculate the utilisation threshold for the historical period rather than the actual historical utilisation. (iv) At this stage Power and Water has not undertaken any analysis on the best probability distribution to apply to the utilisation threshold in the augex model to simulate the needs of the network for each segment. For this reason, we are not in a position to provide an expert view. (v) Power and Water's process involved comparing the actual results to assess the validity of the augex model calibration results.

2.5.2 Methodology and Assumptions

Power and Water engaged Nuttall Consulting to develop a model of PWC's augmentation capex (augex) using the AER's augex model. The model is then used to produce the data in template 2.4.5.

The methodology used to derive the parameters is provided in section 3.2.2 and 3.3.3 of the Nuttall Consulting report submitted by Power and Water to the AER entitled "AER augex model: Assessing the Power and Water Corporation's augex forecast".

2.5.3 Estimated and actual information

The information contained in template 2.4.5 is the output from the augex modelling conducted by Nuttall Consulting. It used information contained in templates 2.4.1, 2.4.2, 2.4.3, 2.4.4, and 2.4.6. It is considered to be actual information.

2.5.4 Source of the information

The source data is the information contained in Templates 2.4.1, 2.4.2, 2.4.3, 2.4.4 and 2.4.6.

2.5.5 Confidential information

We have not identified any confidential information related to this template.

2.6 Template 2.4.6 – Capex and net capacity added by segment group

2.6.1 Consistency with the RIN requirements

Appendix E requirements	Consistency with the RIN requirements
Clause: 2.28 (a) The type of net capacity should match the various types of rating indicated in regulatory templates 2.4.1 to 2.4.4 (on regulatory template 2.4). For example, for zone substations: (i) type 1 reflects the name plate (in service) rating; (ii) type 2 reflects the normal cyclic rating; and (iii) type 3 reflects the N-1 emergency rating.	We have sought to match the type of capacity to the ratings in 2.4.1 to 2.4.4
2.28(b) For the purposes of the regulatory template, 'customer-initiated & capacity-related augmentation' refer to activities for which incurred costs are attributed to at least one of the following AER expenditure categories from (i) to (xi)	We have complied with the AER's instructions to allocate to at least on the AER categories.
2.28(c) For the purposes of the regulatory template, 'NSP-initiated & capacity-related augmentation' refer to activities for which incurred costs are attributed to at least one of the following AER expenditure categories from (i) to (xi)	We have complied with the AER's instructions to allocate to at least on the AER categories.

2.6.2 Methodology and assumptions

The augex and connection expenditure are an output of the capex backcasting model. The high level categorisation including Service Classification, Expenditure Category and Asset Category were performed as described in section 4 of the Category Analysis BOP.

We have mapped the following project codes to augmentation and connection as follows

AER Expenditure Category	Work Category	Work Type	Program
Augmentation	CAPITAL	EXTENSIONS	Not (CUSTOMER CONNECTIONS, CUSTOMER AUGMENTATION, NLS)
Connection	CAPITAL		CUSTOMER CONNECTIONS, CUSTOMER AUGMENTATION

As outlined above, any capital project with Work Type of "EXTENSIONS" and not part of the "CUSTOMER CONNECTIONS", "CUSTOMER AUGMENTATION" or "NLS" programs was defaulted to the "Augmentation" Expenditure Category. In addition, any capital project with a program "CUSTOMER CONNECTIONS" or "CUSTOMER AUGMENATATION" was defaulted to the "Connection" Expenditure Category.

There were many instances where augmentation projects had not been given the correct classifications, as well as projects which contained a combination of replacement and augmentation works. In these cases the relevant assets were manually assigned to the "augmentation" expenditure category. All such manual corrections are clearly identifiable in the capex backcasting methodology described in Appendix A of the Basis of Preparation for the Category Analysis RIN.

There were also many instances where connection projects had not been given the correct Power and Water classifications, as well as projects, which contained augmentation works. In these cases the relevant assets were manually assigned to the "Connection" Expenditure Category. Again, all manual corrections are clearly identifiable in the CAPEX Backcasting Model.

Detailed categorisation

All assets which had been classified as "Augmentation" and "Connection" Expenditure Category were then subject to further categorisation to enable asset costs and quantities to be disaggregated into the augex and connection asset categories in Table 2.4.

Only those assets with expenditure or quantities occurring in the 2013/14 to 2016/17 period were subject to detailed categorisation.

Asset category

Augmentation and Connection Asset Categories were first assigned to each asset in the CAPEX model by mapping from the Power and Water Asset Class. In some cases, a single Power and Water Asset Class can belong to multiple Asset Categories, so the asset voltage was required in these cases. The table below outlines the Augmentation and Connection Asset Categories and the Power and Water Asset Class, which comprise each, as well as any additional rules needed to complete the mapping.

Asset category	Power and Water asset class	Additional rules

Asset category	Power and Water asset class	Additional rules
Subtransmission Substations	HV Circuit Breakers, Power Transformers, Outdoor Disconnectors and Busbars, HV Switchboards, GIS, Substation Auxiliary Plant, Civil and Grounds, Buildings, Instrument Transformers, Capacitor Banks, Protection, Fire Systems, SCADA, Communications	Channel Island, Hudson Creek or Pine Creek 132kV substations
Zone substations	HV Circuit Breakers, Power Transformers, Outdoor Disconnectors and Busbars, HV Switchboards, GIS, Substation Auxiliary Plant, Civil and Grounds, Buildings, Instrument Transformers, Capacitor Banks, Protection, Fire Systems, SCADA, Communications	All other substations
Subtransmission Substations	Cables	Installed completely within subtransmission substation
Zone substations	Cables	Installed completely within zone substation
Subtransmission lines	Conductors, Cables	>= 66kV
Subtransmission lines	Transmission Poles and Towers	
HV Feeder	Distribution Switchgear, Voltage Regulators, Metering Units, Cable Tunnels	
HV Feeder	Conductors, Cables, Distribution Poles, Poletops	> 415V and < 66kV
Distribution Substation	Distribution Substations, Pillars	
Distribution Substation	Conductors, Cables, Distribution Poles, Poletops	<= 415V

Unmodelled Augmentation

Augmentations and Connections were considered unmodelled if the project driver was not directly related to addressing peak demand or capacity needs. Some examples of unmodelled augmentation include:

- Installation of a new dehumidifier in an existing zone substation.
- Installation of a new recloser to address reliability issues.
- Installation of a new pole to raise HV line clearance.

Feeder category

Feeder categories were allocated to “Connections” data when it was not possible to identify a location or feeder for the project. A percentage for each feeder category was calculated

using the existing “Connections” data with known feeder categories. Expenditure against unknown feeder categories was distributed in this proportion.

2.6.3 Estimated and actual information

The information to allocate capex to augmentation and connection is actual based on AER definitions, as it relates to the capex backcasting model which has clear work codes to identify augmentation and connection capex. While estimates and manual adjustments have been used to the source data, we consider the resulting outputs are actual as no alternative assumptions would have yielded a materially different outcome.

2.6.4 Source of the information

The source data is the capex backcasting model.

2.6.5 Confidential information

We have not identified any confidential information related to this template.

3. Template 2.11 – Labour

3.1 Table 2.11.3 – Labour / non-labour expenditure split - standard control services

3.1.1 Methodology and assumptions

We have allocated this information based on the data in templates 2.1 and 2.12 in the Category Analysis Template. Refer to table 2.12 for the magnitude of the expenditures and refer to 2.1 to understand the capex and opex split of the amounts. The Category Analysis RIN only required the data to be reported for 2013-14 to 2016-17 and we were not able to report this data for 2012-13 from our systems. Therefore, we calculated the 2012-13 expenditures as the sum of the capex and opex for SCS and ACS for 2012-13 using the proportions of the expenditure in 2013-14.

The only additional information we used was the account balances associated with the NT Build levy and Network Licence fees, which are uncontrollable costs. We did not identify any other uncontrollable costs.

3.1.2 Estimated and actual information

We used information from other RIN templates which is actual information and data from our financial systems. However, that data is subject to a range of assumptions and the data in the Category Analysis template was partially deemed to be estimated information. This template is based on estimated data and is therefore also estimated information.

3.1.3 Confidential information

Template 2.11 does not contain confidential information.

4. Template 2.16 – Opex Summary

4.1 Template 2.16.1 – Standard Control Services - Opex by Driver

We are only required to provide data for 2 cells relating to historical information in template 2.16. This includes the "Base year total opex, excluding category specific" and "category specific opex" for 2016-17.

4.1.1 Consistency with the RIN requirements

There are no specific requirements for template 2.16 in Appendix E of the RIN.

4.1.2 Methodology and assumptions

We have sourced the 2016-17 opex from the Category Analysis RIN template. We first removed the -$12,770 account balance associated with GSL payments. We then inflated the 2016-17 nominal amount by half a year's inflation for 2016-17, then the full year inflation for 2017-18 and 2018-19 to derive real 2019 dollars, which is required by the template.

We did not identify any category specific opex, and have therefore reported a value of zero. We note this is not a defined term in Appendix F of the RIN.

4.1.3 Estimated and actual information

The source of the data is ultimately our Trial Balance for total opex in 2016-17 and is therefore actual information.

4.1.4 Source of the data

The source data are the accounts in the Trial Balance, and our application of the CAM to allocate costs to standard control services in 2016-17.

4.1.5 Confidential information

We have not identified any confidential information related to this template.

4.2 Template 2.16.2 – Standard Control Services - Opex by Category

The AER has not required any forecast information for this template. We have therefore prepared a basis of preparation response.

5. Template 2.17 – Step Changes

5.1 Template 2.17.5 – Forecast Category Specific Opex

The AER has required us to provide historic information on forecast category specific opex for 2016-17. This includes specifying the category and the description of the item. We note that forecast category specific opex is not a defined term in Appendix F of the RIN. We assume the costs relate to any known step change within the 2016-17 year relating to a category of opex.

5.1.1 Consistency with the RIN requirements

There are no specific requirements in relation to template 2.17.5.

5.1.2 Methodology and assumptions

We note that forecast category specific opex is not a defined term in Appendix F of the RIN. We assume the costs relate to any known step change within the 2016-17 year relating to a category of opex.

We have been unable to identify any specific step changes relating to a category of opex in the 2016-17 actual costs. For this reason we have reported a value of zero.

5.1.3 Estimated and actual information

This is estimated data, as we do not have a system to record “forecast category specific costs”.

5.1.4 Source of the data

We have been unable to identify any source data.

5.1.5 Confidential information

We have been unable to identify any confidential information.

6. Template 7.4– Shared Assets

6.1 Template 7.4.1 – Total Unregulated Revenue Earned with Shared Assets

6.1.1 Consistency with the RIN requirements

Schedule 1 and Appendix E of the RIN do not contain any explicit requirements or instructions for this template. However, Appendix F contains definitions that we have used to determine that the revenue received for our optic fibre network is our only Shared Asset revenue.

6.1.2 Methodology and assumptions

We receive income for the use of our optic fibre network. These amounts are explicitly accounted for and have been sourced from the Statutory Accounts Trial Balance for each year. In years leading up to and including 2013-14 the amounts were sourced from the natural account “33023”. This revenue was previously booked into the retail division and therefore has been sourced from entity “91”.

In 2014-15, after the separation of retail, this revenue was booked to the activity “39” and cost type “417”. For 2014-15 to 2016-17 the amounts were directly sourced from these accounts in the Statutory Accounts Trial balance.

Power and Water is not proposing a revenue apportionment as the entire optic fibre network is included in the RAB and the revenue is only earned from assets included in the RAB.

6.1.3 Estimated and actual information

This information is sourced from the Statutory Accounts Trial Balance and no assumptions have been made. Therefore, this information is actual information as defined by the RIN definition.

6.1.4 Source of the information

Statutory Accounts Trial Balance for each of the relevant financial years.

6.1.5 Confidential information

We have not identified any confidential information.