



# Dalrymple Substation Upgrade

RIT-T: Project Assessment Conclusions Report

November 2013

Version 1



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## 1. Introduction

ElectraNet is proposing a transmission network augmentation on the lower Yorke Peninsula to ensure the reliability standards set out in the South Australian Electricity Transmission Code (ETC)<sup>1</sup> continue to be met at the Dalrymple connection point substation.

This Project Assessment Conclusions Report (PACR) has been prepared by ElectraNet as part of the process for the approval of proposed shared network augmentations as prescribed in the National Electricity Rules (NER)<sup>2</sup>.

The PACR represents the final stage of the consultation process in relation to the application of the Regulatory Investment Test – Transmission (RIT-T) for the upgrade of the Dalrymple connection point. The first stage was the release of the Project Specification Consultation Report (PSCR) in April 2013<sup>3</sup>.

The PSCR:

- Described the identified need which ElectraNet is seeking to address, together with the assumptions used in identifying this need;
- Set out the technical characteristics that a non-network option would be required to deliver in order to address the identified need;
- Described the credible options that ElectraNet considered may address the identified need;
- Discussed specific categories of market benefit which in the case of this specific RIT-T assessment are unlikely to be material; and
- Identified the preferred option and that ElectraNet was claiming an exemption from producing a Project Assessment Draft Report (PADR).

Submissions in response to the PSCR closed on 4 July 2013. No submissions were received.

NER clause 5.16.4(z1) provides for a TNSP to claim exemption from producing a PADR for a particular RIT-T application if all the following conditions are met:

- The estimated capital cost of the preferred option is less than \$35m;
- The preferred option has been identified in the PSCR noting exemption from publishing a PADR;
- The preferred option (or other credible options) do not have a material market benefit; and
- Submissions to the PSCR did not identify additional credible options that could deliver a material market benefit.

As all of the above conditions are satisfied, ElectraNet has not issued a PADR for this RIT-T, but instead is now publishing this PACR.

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<sup>1</sup> Electricity Transmission Code, TC/07 Version 2, available at: [http://www.escosa.sa.gov.au/library/130701-ElectricityTransmissionCode-TC07\\_2.pdf](http://www.escosa.sa.gov.au/library/130701-ElectricityTransmissionCode-TC07_2.pdf).

<sup>2</sup> National Electricity Rules, clause 5.16.4.

<sup>3</sup> ElectraNet, Dalrymple Substation Upgrade, RIT-T: Project Specification Consultation Report, April 2013, <http://www.electranet.com.au/network/current-and-planned-projects/mid-north/dalrymple-substation-upgrade/>

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This PACR:

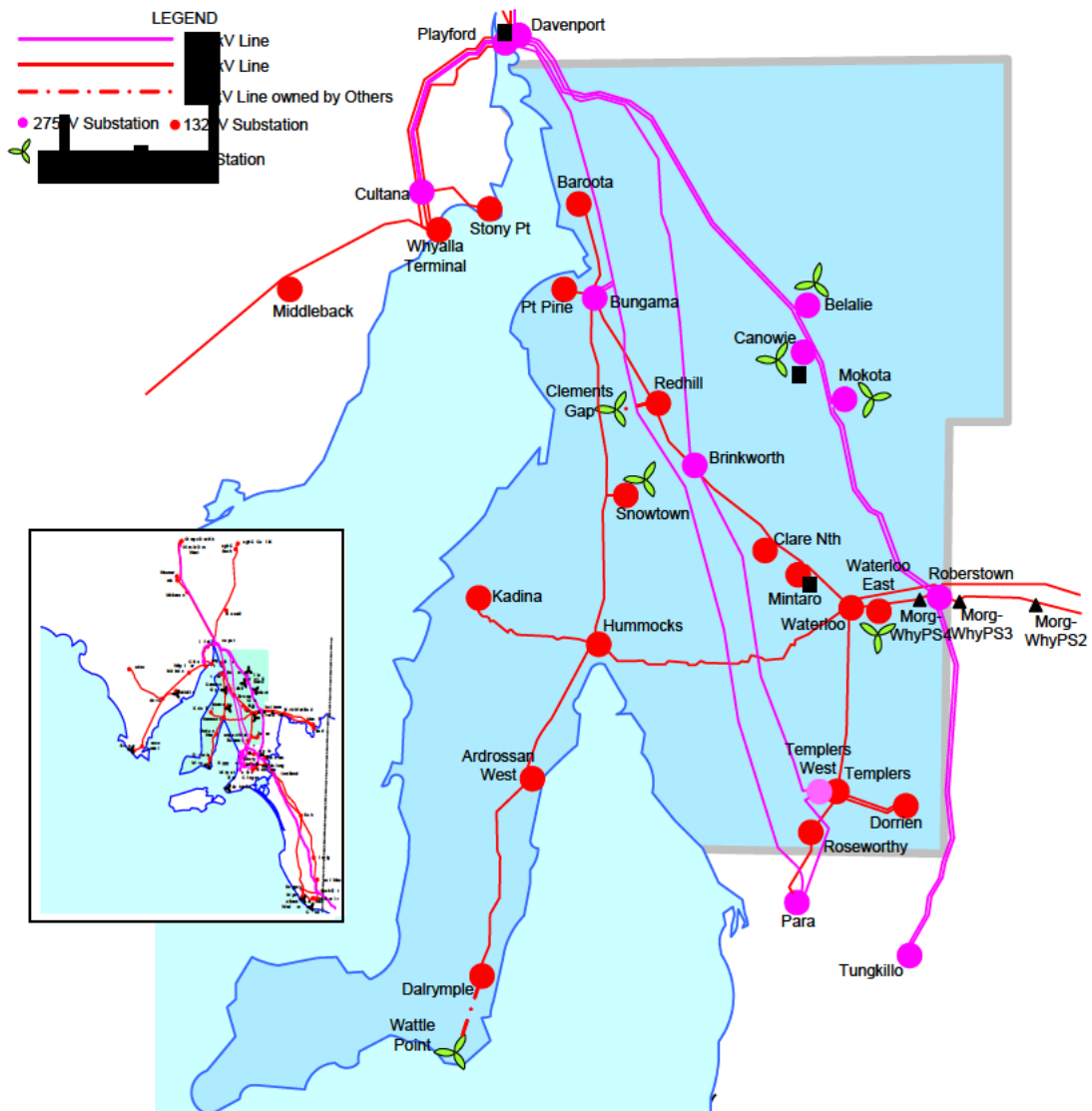
- Describes the identified need and the credible options that ElectraNet considers may address the identified need;
- Provides a quantification of costs and reasons why specific classes of market benefit are not material for the purposes of this RIT-T assessment;
- Provides the results of the net present value (NPV) analysis for each credible option assessed, together with accompanying explanatory statements;
- Describes the consultation process followed for this RIT-T together with the reasons why ElectraNet is exempt from producing a PADR; and
- Identifies the preferred option for investment by ElectraNet and details the technical characteristics and estimated commissioning date of the option.

## 2. Background

### 2.1 Existing Mid North network

The Mid North 132 kV transmission system comprises a network that supplies major load centres at Ardrossan, Brinkworth, Clare, Kadina and Port Pirie, as well as other loads in the Barossa Valley and Yorke Peninsula regions. It derives its supply from the Main Grid 275 kV system via 275/132 kV substations located at Para (near Elizabeth), Templers West, Robertstown, Brinkworth and Bungama (near Port Pirie). Figure 1 is a geographical diagram of the region.

Figure 1: Geographical diagram of the Mid North region



The Dalrymple substation is a shared radial connection point located at the southern end of the regulated transmission network on the Yorke Peninsula<sup>4</sup>. It services a mixture of electrical loads including agriculture, grazing, aquaculture, residential and vacation residences. The Wattle Point wind farm also connects to Dalrymple connection point via a negotiated service.

## 2.2 Committed network developments and existing generation

ElectraNet has a program of committed projects to address supply reliability requirements in the Mid North. These projects are summarised in Table 1 below.

Table 1: Committed projects in the Mid North region

Connection Point	Scope of Work	Timing
Hummocks	Install 2x25 MVA 132/33 kV transformers and upgrade a section of the 132 kV bus	2013
Waterloo	Rebuild Waterloo substation on an adjacent site with 2x25 MVA 132/33 kV transformers	2013
Kadina East	Install 15 MVar 132 kV switched capacitor bank	2013

There are currently no planned or anticipated network developments in the Mid North region that impact on this RIT-T assessment.

Existing generation on the Mid North 132 kV network includes a mixture of gas turbine, diesel fired plants and wind farms. On the Southern tip of the Yorke Peninsula the Wattle Point wind farm has a capacity rating of 90.8 MW.

The Snowtown Stage 2 Wind Farm (due to be commissioned in 2013) is a 270 MW expansion of the existing Snowtown wind farm connecting directly to the 275 kV transmission network. This development will not impact or be impacted by the proposed works at the Dalrymple connection point.

<sup>4</sup> Further information on the Mid North region is available within section 5.4 of ElectraNet's 2013 Transmission Annual Planning Report available at: <http://www.electranet.com.au/assets/Reports-and-Papers/TAPR2013-Final-28June2013final.pdf>



### 3. Identified need

#### 3.1 Description of the identified need

From 1 July 2013, the ETC classifies the Dalrymple connection point as category 2 with an effective date of 1 December 2016. Category 2 requires ElectraNet to provide “N-1” equivalent transformer capacity sufficient to meet 100% of contracted agreed maximum demand (AMD).

This RIT-T has been undertaken as a reliability corrective action<sup>5</sup> in order to ensure that ElectraNet meets the reliability standard set out in the ETC with respect to the Dalrymple connection point. The need for this investment was also identified in ElectraNet’s 2013 Transmission Annual Planning Report (TAPR)<sup>6</sup>.

The existing Dalrymple connection point has a single (“N”) 25 MVA 132/33 kV transformer installed. Reliability corrective action is therefore needed to ensure that, in the event of an unplanned transformer outage, ElectraNet can ensure uninterrupted supply in accordance with the category 2 reliability standard from 1 December 2016.

#### 3.2 Electricity Transmission Code requirements

The Essential Services Commission of South Australia (ESCOSA) is responsible for establishing the ETC, which details the minimum reliability and restoration standards that ElectraNet is required to provide at individual exit points<sup>7</sup>.

Clause 2.4 of the ETC assigns the Dalrymple connection point to reliability category 1 until 1 December 2016. For category 1 connection points, ElectraNet is required to provide “N” equivalent transmission line and transformer capacity for at least 100% of contracted AMD.

From 1 December 2016, the ETC assigns the Dalrymple connection point to reliability category 2. For category 2 connection points, ElectraNet is required to provide “N” equivalent transmission line and “N-1” equivalent transformer capacity for at least 100% of contracted AMD.

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<sup>5</sup> Defined in NER Chapter 10 as “Investment by a Transmission Network Service Provider in respect of its transmission network for the purpose of meeting the service standards linked to the technical requirements of schedule 5.1 or in applicable regulatory instruments and which may consist of network or non-network options”.

<sup>6</sup> ElectraNet’s 2013 TAPR, section 5.4.2.

<sup>7</sup> An ‘exit point’ is defined in the ETC as a *connection point* through which a *transmission customer* imports electricity from the *transmission network*.

Clause 2.6.1(b) of the ETC also requires ElectraNet to:

- (i) *in the event of a failure of any installed transformer or network support arrangement, use its best endeavours to restore “N-1” equivalent transformer capacity as soon as practicable;*
- (ii) *in the event of an interruption arising from the failure of the installed transformers or network support arrangements:*
  - A. *restore at least “N” equivalent transformer capacity within 8 days of the commencement of the interruption; and*
  - B. *use its best endeavours to restore “N-1” equivalent transformer capacity as soon as practicable after the commencement of the interruption.*

Clause 10.1 of the ETC defines “N-1” as follows:

*“N-1” means the ability of the transmission system to continue to supply the contracted amount of agreed maximum demand connected to the transmission system without interruption should any one element fail.*

This reliability corrective action is required to be in service by 1 December 2016. The assumptions, technical characteristics and ElectraNet’s requirement to apply the RIT-T were discussed in sections 3.3-3.5 of the PSCR.

There have been no material changes to these assumptions. The only exception is the demand forecast which has reduced by 1.7 MW from when the PSCR and 2013 Transmission Annual Planning Report were published. However, this change in demand forecast does not change the outcome of the economic assessment that was conducted by ESCOSA, which was the basis for moving the Dalrymple connection point from reliability category 1 to category 2.

## 4. Credible options included in the RIT-T analysis

This section sets out the credible options considered to be capable of addressing the identified need described in section 3.1<sup>8</sup>. All of the credible options are expected to be both technically and commercially feasible. Further, all options are able to be implemented in sufficient time to meet the identified need<sup>9</sup>.

ElectraNet has identified two credible network options which would meet the new ETC reliability standards for the Dalrymple connection point. Both of these options were discussed in the PSCR and no submissions were received.

ElectraNet identified in the PSCR that the only non-network option capable of providing N-1 equivalent transformer capacity at the Dalrymple connection point was likely to be new generation. However, based on the cost estimates, ElectraNet noted that a generation solution would not be economically feasible.

The Wattle Point Wind Farm connects to the Dalrymple connection point through a single circuit 132 kV line. This type of generation is not capable of providing continuous 'N-1' transformer capacity as required by the ETC, because the wind farm cannot commit to continuously supply 100% of contracted AMD. Therefore this option was not considered technically feasible and would not meet the required ETC reliability standard.

No other non-network options were proposed during the consultation period or in response to the PSCR.

### 4.1 Option 1: Extend existing site and install a second 25 MVA 132/33 kV transformer

The proposed scope of work at the Dalrymple connection point (shared site) under option 1 includes:

- install a second 25 MVA 132/33 kV transformer in parallel with the existing transformer at Dalrymple;
- install three new 132 kV circuit breakers to segregate the two transformers arranged in a four breaker mesh bus;
- expand distribution network infrastructure to accommodate the transmission network augmentations including telecommunications and 33 kV feeder works<sup>10</sup>;
- relocation of ElectraNet's telecommunications tower and control building to accommodate the distribution system works;
- extend the boundaries of the existing site to allow space for the transmission and distribution system works described above; and
- generation support during substation commissioning.

<sup>8</sup> For a discussion of other options considered please refer to the PSCR.

<sup>9</sup> In accordance with the requirements of NER clause 5.15.2(a).

<sup>10</sup> A third 33 kV line exit is also proposed as part of SA Power Networks' works at Dalrymple to split the existing Pt Giles – Kleins Point exit into two distinct line exits, thereby improving the 33 kV line's reliability through removal of the tee point, provide greater operational flexibility and also to mitigate potential voltage constraints on the Pt Vincent – Minlaton 33 kV line. Delivering these relatively minor incidental works as part of the scope of works serves to promote overall efficiency.

Figure 2 below presents an electrical representation of the Dalrymple connection point after augmentations required under option 1 are implemented. Existing assets are shown in black while augmented assets are shown in red.

There is insufficient space at the existing substation to accommodate a second 132/33 kV transformer and a four breaker mesh bus without extending the boundaries of the site. ElectraNet currently owns the vacant land surrounding the substation which reduces the cost of extending the substation boundary.

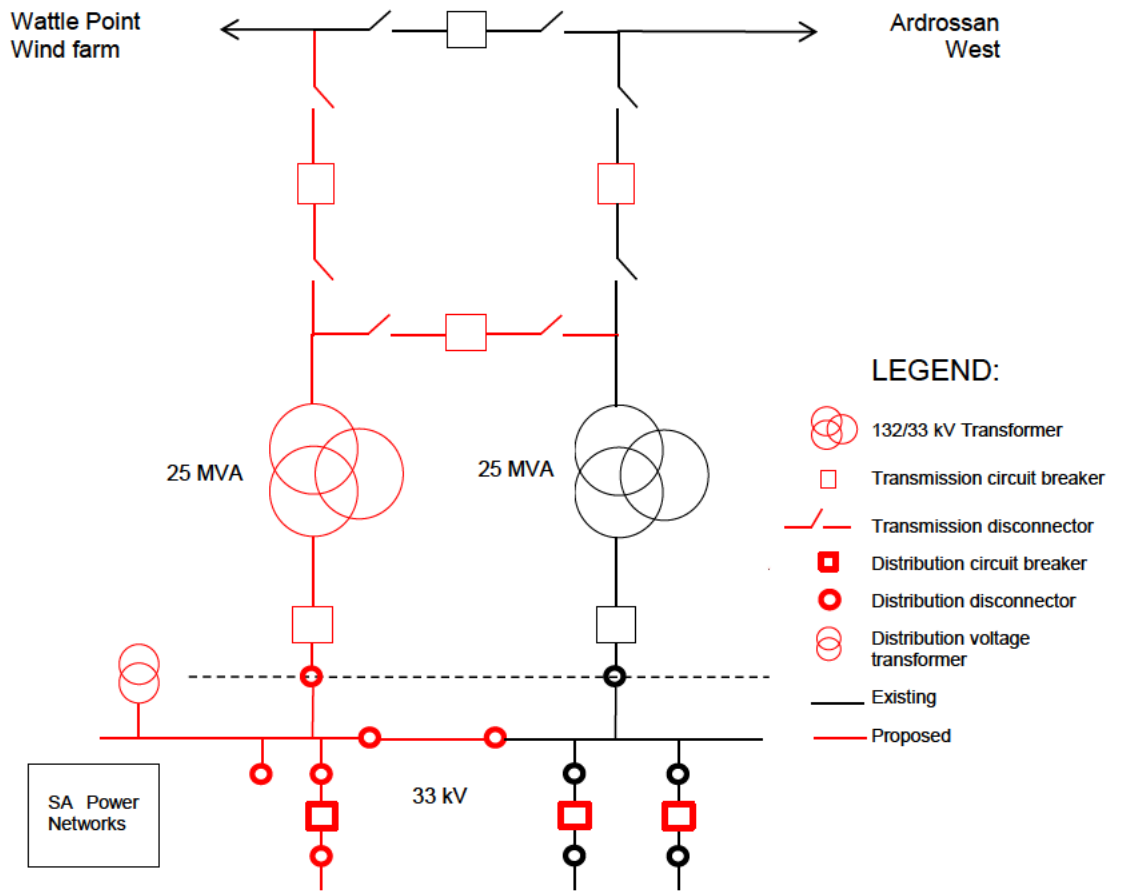
Currently the single circuit breaker at the Dalrymple connection point services the Wattle Point Wind Farm as a negotiated service. As this section of the substation will be required to provide prescribed services for 100% of the time, the associated assets will require conversion to prescribed network assets. The conversion would need to be approved by the Australian Energy Regulator in ElectraNet's next revenue determination in 2018. The costs associated with these converted assets are included in the ElectraNet estimate.

Some generation support will be needed during the implementation of the augmentations described above to minimise interruptions to the load supplied from Dalrymple.

The ElectraNet costs are estimated to be \$21.2 million and SA Power Networks costs are estimated to be \$5.6 million. The total estimated capital cost (in 2013/14 dollars) of option 1 is \$26.8 million. Annual operating and maintenance costs are estimated to be around 2% of the capital cost.

The estimated construction timetable is around 12 months, with commissioning prior to 1 December 2016 as required by the ETC.

**Figure 2: Configuration of the existing Dalrymple connection point under option 1**



#### 4.2 Option 2: Rebuild the Dalrymple connection point substation at a nearby site and install two 25 MVA 132/33 kV transformers

The proposed scope of work at both the existing Dalrymple connection point and the proposed new site under option 2 includes:

- rebuild Dalrymple connection point at a nearby site;
- relocate and install the existing transformer at the new site and install a second 25 MVA 132/33 kV transformer in parallel with the existing transformer;
- install four new 132 kV circuit breakers to segregate the two transformers arranged in a four breaker mesh bus (allowing for an ultimate configuration of a six breaker mesh bus);
- 132 kV line works to connect new substation to existing transmission system;
- expand distribution network infrastructure at the existing Dalrymple connection point to accommodate transmission network augmentations, including the installation of an additional two 33 kV circuit breakers and 33 kV line works to connect the distribution network assets at the existing site to the new site<sup>11</sup>;
- generation support during substation commissioning; and
- decommission the transmission network assets at the existing Dalrymple connection point substation.

Figure 3: Configuration of the rebuilt Dalrymple connection point and existing substation under option 2 presents an electrical representation of the rebuilt transmission assets at the new site and distribution assets at the existing Dalrymple connection point after augmentations required under option 2 are implemented. Existing assets are shown in black while augmented assets are shown in red. The transmission network arrangement shown in Figure 3 is very similar to that shown for option 1 in Figure 2, except for the slightly different transformer and line exit arrangement due to the more limited space available when extending the existing substation under option 1.

ElectraNet currently owns the vacant land upon which the rebuilt substation would be situated which reduces the cost of option 2.

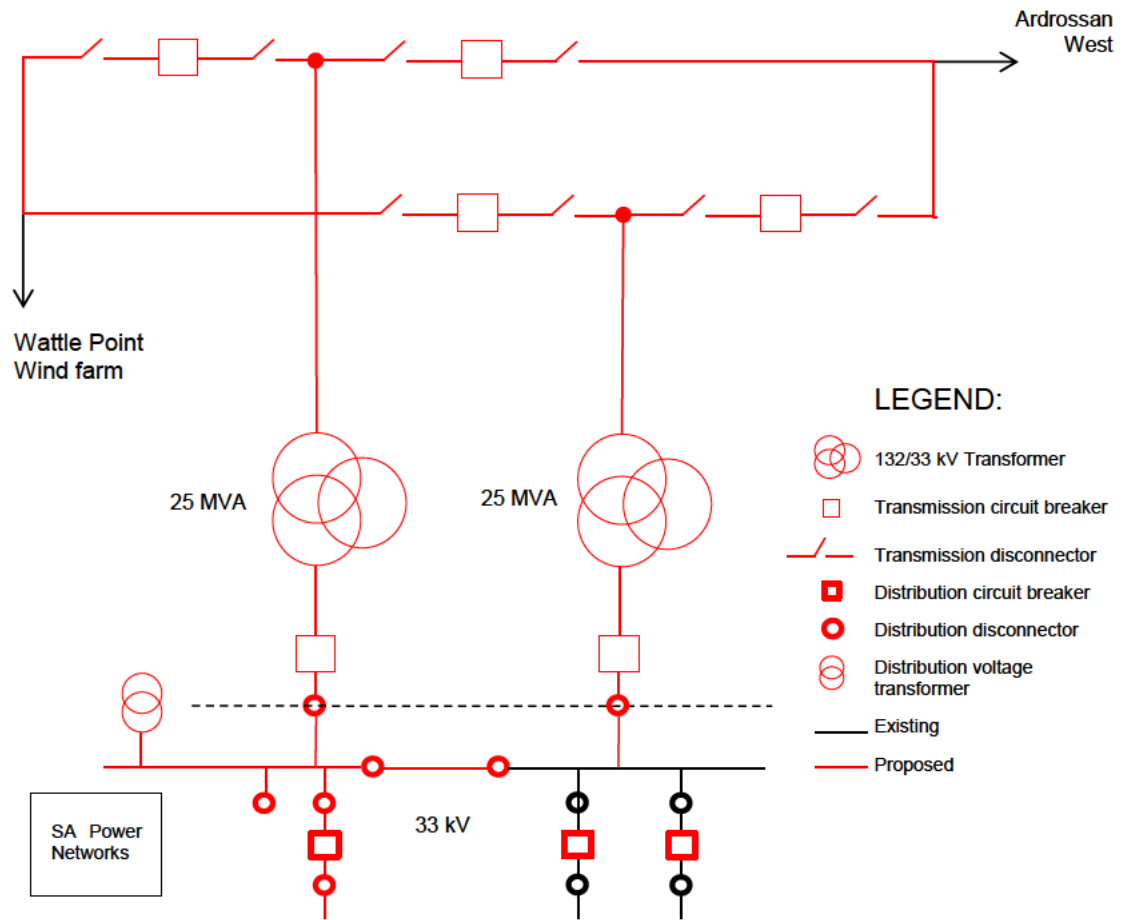
ElectraNet costs are estimated to be \$26.3 million and SA Power Networks costs are estimated to be \$6.9 million. The total estimated capital cost (in 2013/14 dollars) of option 2 is \$33.2 million. Annual operating and maintenance costs are estimated to be around 2% of the capital cost.

The estimated construction timetable is around 12 months, with commissioning prior to 1 December 2016 as required by the ETC.

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<sup>11</sup> A third 33 kV line exit is also proposed as part of SA Power Networks' works at Dalrymple to split the existing Pt Giles – Kleins Point exit into two distinct line exits, thereby improving the 33 kV line's reliability through removal of the tee point, provide greater operational flexibility and also to mitigate potential voltage constraints on the Pt Vincent – Minlaton 33 kV line. Delivering these relatively minor incidental works as part of the scope of works serves to promote overall efficiency.

**Figure 3: Configuration of the rebuilt Dalrymple connection point and existing substation under option 2**

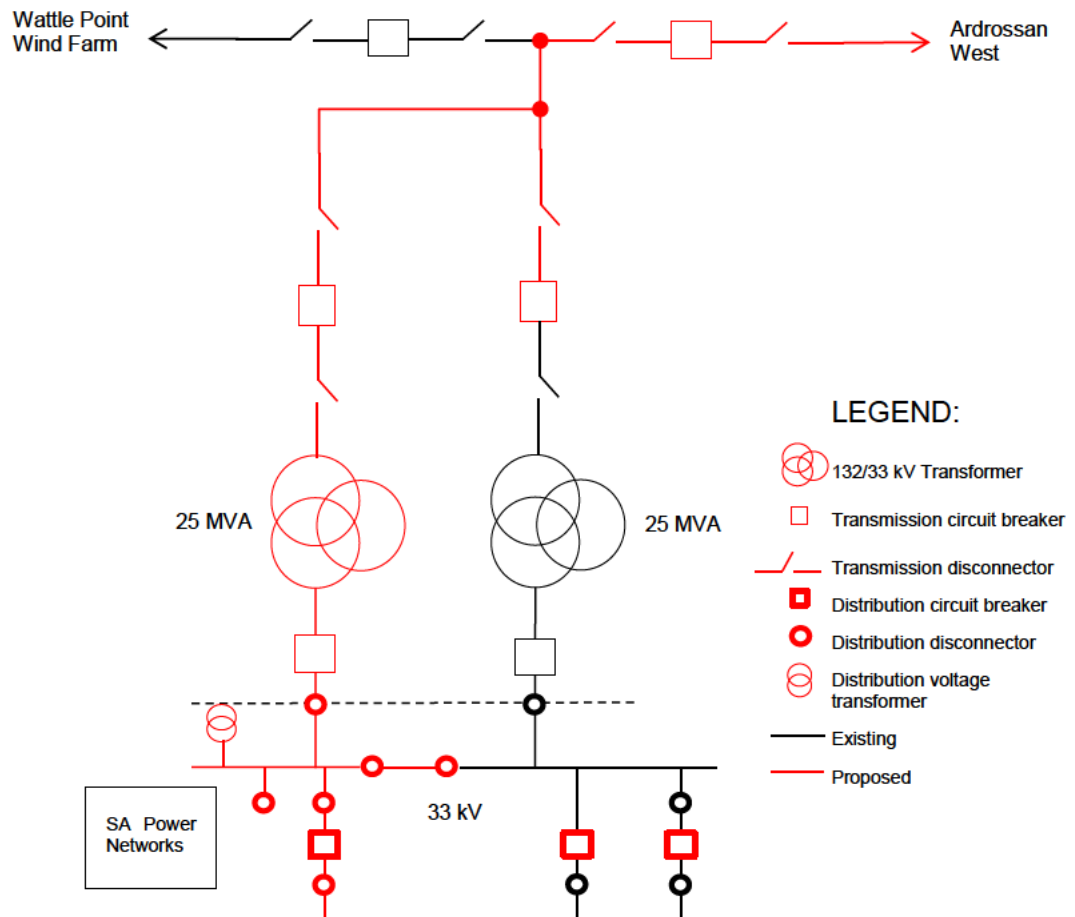


### 4.3 Option considered but not progressed

A potentially less expensive single bus option (refer Figure 4 below) at Dalrymple 132 kV substation has been considered but was not progressed for the following reasons:

- A 132 kV mesh bus configuration is in line with good electricity industry practice and provides higher reliability, greater flexibility and security of supply compared to a single bus arrangement; and
- Proceeding with such a single bus arrangement would preclude the Dalrymple substation from being upgraded to a 132 kV mesh bus in future.

Figure 4: Configuration of the existing Dalrymple connection point under option considered but not progressed



### 4.4 Material inter-regional impact

In accordance with NER clause 5.16.4(b)(6)(ii), ElectraNet has considered whether any of the credible options above are expected to have a material interregional impact. ElectraNet considers this to be the same as a material inter-network impact, which is defined in the NER as:



“A material impact on another Transmission Network Service Provider’s network, which may include (without limitation): (a) the imposition of power transfer constraints within another Transmission Network Service Provider’s network; or (b) an adverse impact on the quality of supply in another Transmission Network Service Provider’s network.”

AEMO currently defines the criteria for material inter-network impact. AEMO’s suggested screening test for establishing that a transmission augmentation has no material inter-network impact is that it satisfies the following:<sup>12</sup>

- A decrease in power transfer capability between the transmission networks or in another TNSP’s network of no more than the minimum of 3 per cent of the maximum transfer capability and 50 MW;
- An increase in power transfer capability between transmission networks of no more than the minimum of 3 per cent of the maximum transfer capability and 50 MW;
- An increase in fault level by less than 10 MVA at any substation in another TNSP’s network; and
- The investment does not involve either a series capacitor or modification in the vicinity of an existing series capacitor.

ElectraNet notes that none of the credible options set out in this PACR involve either a series capacitor or modification in the vicinity of an existing series capacitor. Neither are any of the credible options discussed above expected to result in change in power transfer capability between South Australia and neighbouring transmission networks. In addition fault levels are not expected to increase by more than 10 MVA at any substation in another TNSP’s network.

As a consequence, by reference to AEMO’s screening criteria, there are no material inter-network impacts associated with any of the credible options.

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<sup>12</sup> The screening test is set out in Appendix 3 of the *IRPC’s Final Determination: Criteria for Assessing Material Inter-Network Impact of Transmission Augmentations, Version 1.3*, October 2004.

## 5. Materiality of market benefits for this RIT-T assessment

The NER require that all categories of market benefit identified in relation to the RIT-T are included in the RIT-T assessment, unless the TNSP can demonstrate that a specific category (or categories) is unlikely to be material in relation to the RIT-T assessment for a specific option<sup>13</sup>.

This PACR must provide the reasons why ElectraNet has determined that a class or classes of market benefit are not material for a particular RIT-T assessment<sup>14</sup>.

### 5.1 Market benefits relating to the wholesale market

The AER has recognised that if the proposed investment will not have an impact on the wholesale market, then a number of classes of market benefits will not be material in the RIT-T assessment, and so do not need to be estimated<sup>15</sup>.

The credible network options described in section 4 do not address network constraints between competing generating centres and are therefore not expected to result in any change in dispatch outcomes and wholesale market prices.

Therefore, ElectraNet considers that the following classes of market benefits are not material for this RIT-T assessment for any of the credible network options:

- changes in fuel consumption arising through different patterns of generation dispatch;
- changes in voluntary load curtailment (since there is no impact on pool price);
- changes in costs for parties, other than for ElectraNet (since there will be no deferral of generation investment);
- changes in ancillary services costs;
- competition benefits; and
- Renewable Energy Target (RET) penalties.

### 5.2 Other classes of market benefits

In addition to the classes of market benefits listed above, NER clause 5.16.1(c)(4) requires ElectraNet to consider the following classes of market benefits in relation to each credible option:

- differences in the timing of transmission investment;
- option value;
- changes in network losses; and
- changes in involuntary load shedding.

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<sup>13</sup> NER clause 5.16.1(c)(6).

<sup>14</sup> In accordance with NER clauses 5.16.4(k)(5) and 5.16.4(v)(1).

<sup>15</sup> AER, *Final Regulatory Investment Test for Transmission Application Guidelines*, June 2010, version 1, page 15.

ElectraNet considers that none of the four classes of market benefits listed above are material for this RIT-T assessment for the reasons set out below. ElectraNet does not consider that there are any other classes of market benefits which would be material for the purposes of this RIT-T assessment. No submissions were received in response to the PSCR that suggested that this conclusion needs to be revisited.

### 5.2.1 Differences in the timing of transmission investment

ElectraNet considers that neither of the credible options discussed in section 4.1 will affect the timing of other unrelated transmission investments (i.e. transmission investments based on a need that falls outside the scope of that described in section 3.1.) Consequently, ElectraNet considers that market benefits associated with differences in the timing of unrelated transmission investment are not material to the credible options subject to this RIT-T assessment.

### 5.2.2 Option value

ElectraNet notes the AER's view that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change and the credible options considered by the TNSP are sufficiently flexible to respond to that change<sup>16</sup>.

ElectraNet also notes the AER's view that appropriate identification of credible options and reasonable scenarios captures any option value, thereby meeting the NER requirement to consider option value as a class of market benefit under the RIT-T.

ElectraNet notes that changes in future demand levels are not relevant for this RIT-T, since the need for and timing of the required investment is being driven by an ETC category change rather than future demand growth. As a result, it is not relevant to consider different future demand scenarios in undertaking the RIT-T analysis. In addition, the sensitivity analysis discussed in section 6.2 has highlighted that the ranking of the options under the RIT-T is robust to changes in key assumptions (specifically network capital costs and the discount rate for the NPV analysis).

The estimation of any additional option value benefit would require a significant modelling assessment, which would be disproportionate to any additional option value benefit that may be identified for this specific RIT-T assessment. Therefore, ElectraNet has not estimated any additional option value market benefit for this RIT-T assessment.

### 5.2.3 Changes in network losses and involuntary load shedding

Given that network options 1 and 2 provide the same network capacity at two nearby locations, differences in changes in network losses and involuntary load shedding between the two options will be minimal. ElectraNet considers that the magnitude of the difference in the change in network losses or involuntary load shedding between the two credible options compared to the cost difference between the options is such that these categories of market benefit would not be expected to materially affect the RIT-T outcome and therefore are not material for this RIT-T assessment.

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<sup>16</sup> AER, *Final Regulatory Investment Test for Transmission Application Guidelines*, June 2010, version 1, pages 39 and 75.

## 6. Identification of the preferred option

This section sets out the results of the net present value (NPV) analysis for each of the credible options discussed in section 4 and identifies the preferred option under the RIT-T<sup>17</sup>.

### 6.1 Net market benefits and the preferred option

ElectraNet has undertaken an NPV assessment in relation to the net market benefit of each of the credible options set out in section 4.1, in line with the RIT-T requirements.

The RIT-T defines the net market benefit for each option as the gross market benefit for that option, weighted across the reasonable scenarios considered, minus the costs of each option, all in present value terms.

As identified in section 5, there are no classes of market benefits that ElectraNet considers to be material for the purposes of this RIT-T assessment. The assessment of the net market benefit for each credible option is therefore based on the cost estimate for that option, in present value terms.

The RIT-T requires the calculation of market benefits to be undertaken across relevant reasonable scenarios<sup>18</sup>. The RIT-T states that the number and choice of reasonable scenarios must be appropriate to the credible options under consideration. Where the identified need is for reliability corrective action, the choice of reasonable scenarios must reflect any variables or parameters that are likely to affect the ranking of the credible options<sup>19</sup>. In addition, where there is a material degree of uncertainty in relation to the costs of a credible option, the RIT-T requires that the cost be calculated as a probability weighted present value of the direct costs under a range of different cost assumptions<sup>20</sup>.

Sensitivity analysis performed by ElectraNet and presented in section 6.2 below demonstrates that the ranking of the credible options considered in this RIT-T assessment is robust to changes in the key assumptions, notably, changes in the discount rate used in the NPV analysis and different network capital cost assumptions. Therefore, changes in these variables need not be included as additional reasonable scenarios for the purposes of the NPV assessment. This approach is consistent with the AER RIT-T Assessment Guidelines<sup>21</sup>. ElectraNet notes that changes in future demand levels are not relevant for this RIT-T, since the need for and timing of the required investment is being driven by an ETC category change rather than future demand growth. As a result, it is not relevant to consider different future demand scenarios in undertaking the RIT-T analysis.

ElectraNet has conducted NPV analysis on both credible options in order to identify the preferred option. The NPV analysis has been undertaken over a period of 15 years from 2015/16 to 2029/30 using a discount rate of 10% (real, pre-tax)<sup>22</sup>. Table 2 summarises the net market benefit in NPV terms for each credible option.

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<sup>17</sup> In accordance with NER clauses 5.16.4(k)(8) and 5.16.4(v)(1).

<sup>18</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 4, page 3.

<sup>19</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 16(a), page 7.

<sup>20</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 16(a), page 7.

<sup>21</sup> AER, *Regulatory Investment Test for Transmission Application Guidelines*, June 2010, p.26.

<sup>22</sup> This discount rate represents a reasonable commercial rate, appropriate for the analysis of a private enterprise investment in the electricity sector as required by the RIT-T (AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 14, page 6).

**Table 2: Net market benefit for each credible option (PV, \$m)**

Credible Option	Net Market Benefit	Ranking under RIT-T
<b>Option 1:</b> Extend existing site and install a second 132/33 kV transformer	-\$26.8	1
<b>Option 2:</b> Rebuild Dalrymple connection point substation at a nearby site and install a second 132/33 kV transformer	-\$33.2	2

Table 2 shows that option 1 has the greatest net market benefit and is therefore the preferred option under this RIT-T assessment. Given that the identified need in this case is for reliability corrective action, as stated in section 3.1, it is allowable for the preferred option to have a negative net market benefit (i.e. a net economic cost).

Option 1 is the preferred option in accordance with NER clause 5.16.1(b) because it is the credible option that maximises the net present value of the net economic benefit to all those who produce, consume and transport electricity in the market<sup>23</sup>.

The estimated commissioning date for option 1 is November 2016 to ensure ElectraNet meets the increased reliability standard applying to the Dalrymple connection point from 1 December 2016. The total capital cost of the option is estimated at \$26.8 million (in 2013/14 dollars). The technical characteristics of this option have been set out in section 4.1. As described in section 4.3, this option is not expected to have an inter-regional impact<sup>24</sup>.

## 6.2 Sensitivity to different discount rates and capital cost assumptions

ElectraNet has tested the sensitivity of the results to changes in the discount rate and capital cost assumptions.

In relation to the discount rate, ElectraNet has incorporated a lower bound discount rate of 7.5%<sup>25</sup> as reflective of the regulatory weighted average cost of capital and a higher discount rate of 13%.

In relation to assumed network capital costs, ElectraNet has tested the impact on the RIT-T outcome of increasing the capital cost estimate for option 1 (upgrading the existing site) by 20%, compared to option 2 (the rebuild option). Given that the NPV assessment is driven by the relative differences in capital costs between the two options, it is relative changes in capital costs that could potentially change outcomes.

The results of the sensitivity analysis are summarised in Table 3. The relative ranking of the options for each sensitivity is shown in brackets.

<sup>23</sup> As set out in clause 5.16.1(b) of the NER, a preferred option may have a negative net economic benefit (ie a net economic cost) where the identified need is for reliability corrective action.

<sup>24</sup> In accordance with NER clauses 5.16.4(k)(9) and 5.16.4(v)(1).

<sup>25</sup> This is the lower bound scenario for the discount rate, specified in AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 15(g), page 7. The estimate of the regulatory WACC (real, pre-tax) that would apply to ElectraNet is based on the AER's final revenue determination for ElectraNet: <http://www.aer.gov.au/node/16617>.

**Table 3: Sensitivity to different discount rates and capital cost assumptions (\$m)**

Sensitivity	Option 1	Option 2
If 7.5% discount rate applied	-\$25.8 (1)	-\$32.0 (2)
If 13% discount rate applied	-\$27.6 (1)	-\$34.1 (2)
If network capital cost estimate of option 1 increased by 20%	-\$32.2 (1)	-\$33.2 (2)

The sensitivity analysis demonstrates that varying the discount rate does not affect the ranking of the options under the RIT-T. Option 1 remains ranked first, with a materially higher net market benefit.

ElectraNet does not consider it feasible for option 1 to have a significant capital cost variation relative to option 2. Both options require similar plant and involve similar construction activities at the same geographical location. However, notwithstanding this, the results of the sensitivity analysis show that a 20% increase in the assumed capital cost of option 1 when compared with unchanged capital cost assumptions for option 2 is also insufficient to change the rankings of the options.

## 7. Consultation Process

NER clause 5.16.4 establishes a three stage process for applying the RIT-T:

- Preparing a Project Specification Consultation Report (PSCR) which includes a description of the identified need for the investment, assumptions upon which the identified need is based, technical characteristics that a non-network option would be required to deliver and information regarding the credible options identified. The period for consultation on the PSCR must be at least 12 weeks.
- Preparing a Project Assessment Draft Report (PADR) which includes a description of the credible options assessed, a summary of and response to any submissions received, quantification of the costs and classes of material market benefit for each credible option, the results of net present value analysis and identification of the proposed preferred option. The period for consultation on the PADR must be at least 6 weeks.
- Preparing a Project Assessment Conclusions Report (PACR) which includes the information required within the PADR and a summary of and response to any submissions received.

NER clause 5.16.4(z1) provides for a TNSP to be exempt from producing a PADR for a particular RIT-T application if all of the following conditions are met:

- The estimated capital cost of the preferred option is less than \$35 million;
- The TNSP identifies in its PSCR its proposed preferred option, together with its reasons for the preferred option and notes that the proposed investment has the benefit of the clause 5.16.4(z1) exemption;
- The TNSP considers that the proposed preferred option and any other credible options in respect of the identified need will not have a material market benefit for the classes of market benefit specified in clause 5.16.1(c)(4), with the exception of market benefits arising from changes in voluntary and involuntary load shedding; and
- The TNSP forms the view that no submissions were received on the PSCR which identified additional credible options that could deliver a material market benefit.

In the PSCR relating to this RIT-T assessment, ElectraNet considered that the proposed investments regarding the upgrade of the Dalrymple connection point had the benefit of the exemption under NER clause 5.16.4(z1). This continues to be the case because all the conditions provided within clause 5.16.4(z1) have been met.

The PSCR for this RIT-T assessment was published in April 2013 and was open for consultation until 4 July 2013. No submissions were received in response to the PSCR. As a consequence, no additional credible options that could deliver a material market benefit have been identified in submissions.

The preferred option for addressing the identified need, as detailed in section 6.1, is network option 1, extending the existing Dalrymple connection point and installing a second 132/33 kV transformer. This option was described in section 4.1 and is estimated to have a capital cost of \$26.8 million, which is below the \$35 million threshold for the exemption. Section 5 has noted that there are no material categories of market benefit associated with the proposed preferred option or any other credible option.

## 8. Preferred Option

The preferred option for addressing the identified need, in accordance with NER clause 5.16.1(b), is network option 1: extending the existing Dalrymple connection point and installing a second 132/33 kV transformer.

This is the credible option that maximises the net present value of the net economic benefit to all those who produce, consume and transport electricity in the market<sup>26</sup>, as set out in section 6.1.

The total capital cost of the option is estimated at \$26.8million (in 2013/14 dollars). The technical characteristics of this option have been set out in section 4.1.

The estimated commissioning date for option 1 is November 2016 to ensure ElectraNet meets the increased reliability standard applying to the Dalrymple connection point from 1 December 2016.

This option is not expected to have an inter-regional impact<sup>27</sup>, as described in section 4.3.

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<sup>26</sup> As set out in clause 5.16.1(b) of the NER, a preferred option may have a negative net economic benefit (ie a net economic cost) where the identified need is for reliability corrective action.

<sup>27</sup> In accordance with NER clauses 5.16.4(k)(9) and 5.16.4(v)(1).



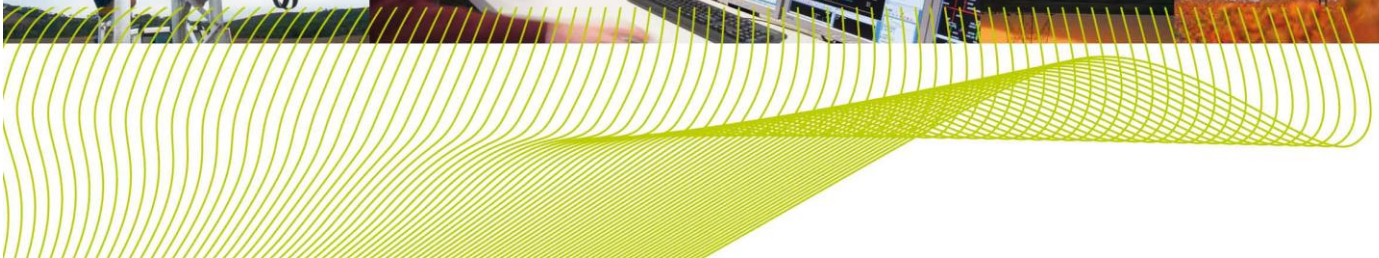


# Dalrymple Substation Upgrade

Appendices

November 2013

Version 1



## Appendix A Definitions

Applicable regulatory instruments	All laws, regulations, orders, licences, codes, determinations and other regulatory instruments (other than the Rules) which apply to Registered Participants from time to time, including those applicable in each participating jurisdiction as listed below, to the extent that they regulate or contain terms and conditions relating to access to a network, connection to a network, the provision of network services, network service price or augmentation of a network.
AEMO	Australian Energy Market Operator
Base case	A situation in which no option is implemented by, on behalf of the transmission network service provider.
Commercially feasible	<p>An option is commercially feasible under clause 5.6.5D(a)(2) of the Electricity Rules if a reasonable and objective operator, acting rationally in accordance with the requirements of the RIT-T, would be prepared to develop or provide the option in isolation of any substitute options<sup>28</sup>.</p> <p>This is taken to be synonymous with ‘economically feasible’.</p>
Costs	Costs are the present value of the direct costs of a credible option.
Credible option	<p>A credible option is an option (or group of options) that:<sup>29</sup></p> <ol style="list-style-type: none"><li>(1) address the identified need;</li><li>(2) is (or are) commercially and technically feasible; and</li><li>(3) can be implemented in sufficient time to meet the identified need.</li></ol>
Economically feasible	<p>An option is likely to be economically feasible where its estimated costs are comparable to other credible options which address the identified need. One important exception to this general guidance applies where it is expected that a credible option or options are likely to deliver materially higher market benefits. In these circumstances the option may be “economically feasible” despite the higher expected cost.<sup>30</sup></p> <p>This is taken to be synonymous with ‘commercially feasible’.</p>
ETC	The Electricity Transmission Code TC/07 (version 2) is an industry code made by The Essential Services Commission of South Australia (ESCOSA) under section 28 of the Essential Services Act of SA (ESC).
Identified need	The reason why the Transmission Network Service Provider proposes that a particular investment be undertaken in respect of its transmission network. <sup>31</sup>

<sup>28</sup> AER, *Final Regulatory Investment Test for Transmission Guidelines*, June 2010, version 1, page 10.

<sup>29</sup> NER clause 5.6.5D(a).

<sup>30</sup> AER, *Final Regulatory Investment Test for Transmission Guidelines*, June 2010, version 1, page 6.

<sup>31</sup> NER, Glossary.

Market benefit	Market benefit must be: <sup>32</sup> (a) the present value of the benefits of a credible option calculated by: (i) comparing, for each relevant reasonable scenario: (A) the state of the world with the credible option in place to (B) the state of the world in the base case, And (ii) weighting the benefits derived in sub-paragraph (i) by the probability of each relevant reasonable scenario occurring. (b) a benefit to those who consume, produce and transport electricity in the market, that is, the change in producer plus consumer surplus.
Net economic benefit	Net economic benefit equals the market benefit less costs. <sup>33</sup>
Preferred option	The preferred option is the credible option that maximises the net economic benefit to all those who produce, consume and transport electricity in the market compared to all other credible options. Where the identified need is for reliability corrective action, a preferred option may have a negative net economic benefit (that is, a net economic cost). <sup>34</sup>
Reasonable scenario	Reasonable scenario means a set of variables or parameters that are not expected to change across each of the credible options or the base case. <sup>35</sup>
Reliability corrective action	Investment by a Transmission Network Service Provider in respect of its transmission network for the purpose of meeting the service standards linked to the technical requirements of schedule 5.1 or in applicable regulatory instruments and which may consist of network or non-network options. <sup>36</sup>
State of the world	State of the world means a reasonable and mutually consistent description of all of the relevant market supply and demand characteristics and conditions that may affect the calculation of <i>market benefits</i> over the period of the assessments. <sup>37</sup>

<sup>32</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph (4), page 3.

<sup>33</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph (1), page 1.

<sup>34</sup> NER 5.6.5B(b); and AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph (1), page 1.

<sup>35</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 15, page 6.

<sup>36</sup> NER, Glossary.

<sup>37</sup> AER, *Final Regulatory Investment Test for Transmission*, June 2010, version 1, paragraph 17, page 7.

## Appendix B Checklist of Compliance Clauses

This section sets out a compliance checklist which demonstrates the compliance of the RIT-T with the requirements of clauses 5.16.4(v), (k), (z1) and (z2) of the NER version 55.

NER clause	Summary of Requirements	Section
5.16.4(v)	The project assessment conclusions report must set out: (1) the matters detailed in the project assessment draft report as required under paragraph (k); and	See below
	(2) a summary of, and the RIT-T proponent's response to, submissions received, if any, on the project assessment draft report.	n/a [No submissions received]
5.16.4(k)	The project assessment draft report must include: (1) a description of each credible option assessed;	Section 4.1 Section 4.2
	(2) a summary of, and commentary on, the submissions to the project specification consultation report;	n/a [No submissions received]
	(3) a quantification of the costs, including a breakdown of operating and capital expenditure, and classes of material market benefit for each credible option;	Section 4.1 Section 4.2 Section 5
	(4) a detailed description of the methodologies used in quantifying each class of material market benefit and cost;	n/a
	(5) reasons why the RIT-T proponent has determined that a class or classes of market benefit are not material;	Section 5
	(6) the identification of any class of market benefit estimated to arise outside the region of the Transmission Network Service Provider affected by the RIT-T project, and quantification of the value of such market benefits (in aggregate across all regions);	n/a
	(7) the results of a net present value analysis of each credible option and accompanying explanatory statements regarding the results;	Section 6
	(8) the identification of the proposed preferred option;	Section 8
	(9) for the proposed preferred option identified under subparagraph (8), the RIT-T proponent must provide: (i) details of the technical characteristics; (ii) the estimated construction timetable and commissioning date; (iii) if the proposed preferred option is likely to have a material inter-network impact and if the Transmission Network Service Provider affected by the RIT-T project has received an augmentation technical	Section 6.1 Section 6.1 Section 4.3 Section 8

NER clause	Summary of Requirements	Section
	<p>report, that report; and</p> <p>(iv) a statement and the accompanying detailed analysis that the preferred option satisfies the RIT-T.</p>	Section 6.1
5.16.4(z1)	<p>A RIT-T proponent is exempt from paragraphs (j) to (s) if:</p> <p>(1) the estimated capital cost of the proposed preferred option is less than \$35 million (as varied in accordance with a cost threshold determination);</p> <p>(2) the relevant Network Service Provider has identified in its project specification consultation report:</p> <p>(i) its proposed preferred option;</p> <p>(ii) its reasons for the proposed preferred option; and</p> <p>(iii) that its RIT-T project has the benefit of this exemption;</p> <p>(3) the RIT-T proponent considers, in accordance with clause 5.16.1(c)(6), that the proposed preferred option and any other credible option in respect of the identified need will not have a material market benefit for the classes of market benefit specified in clause 5.16.1(c)(4) except those classes specified in clauses 5.16.1(c)(4)(ii) and (iii), and has stated this in its project specification consultation report; and</p> <p>(4) the RIT-T proponent forms the view that no submissions were received on the project specification consultation report which identified additional credible options that could deliver a material market benefit.</p>	<p>Section 7</p> <p>Section 7</p> <p>Section 7</p> <p>Section 7</p>
5.16.4(z2)	<p>The RIT-T proponent must address in the project assessment conclusions report any issues that were raised in relation to a proposed preferred option to which paragraph (z1) applies during the consultation on the project specification consultation report.</p>	<p>n/a [No submissions received]</p>