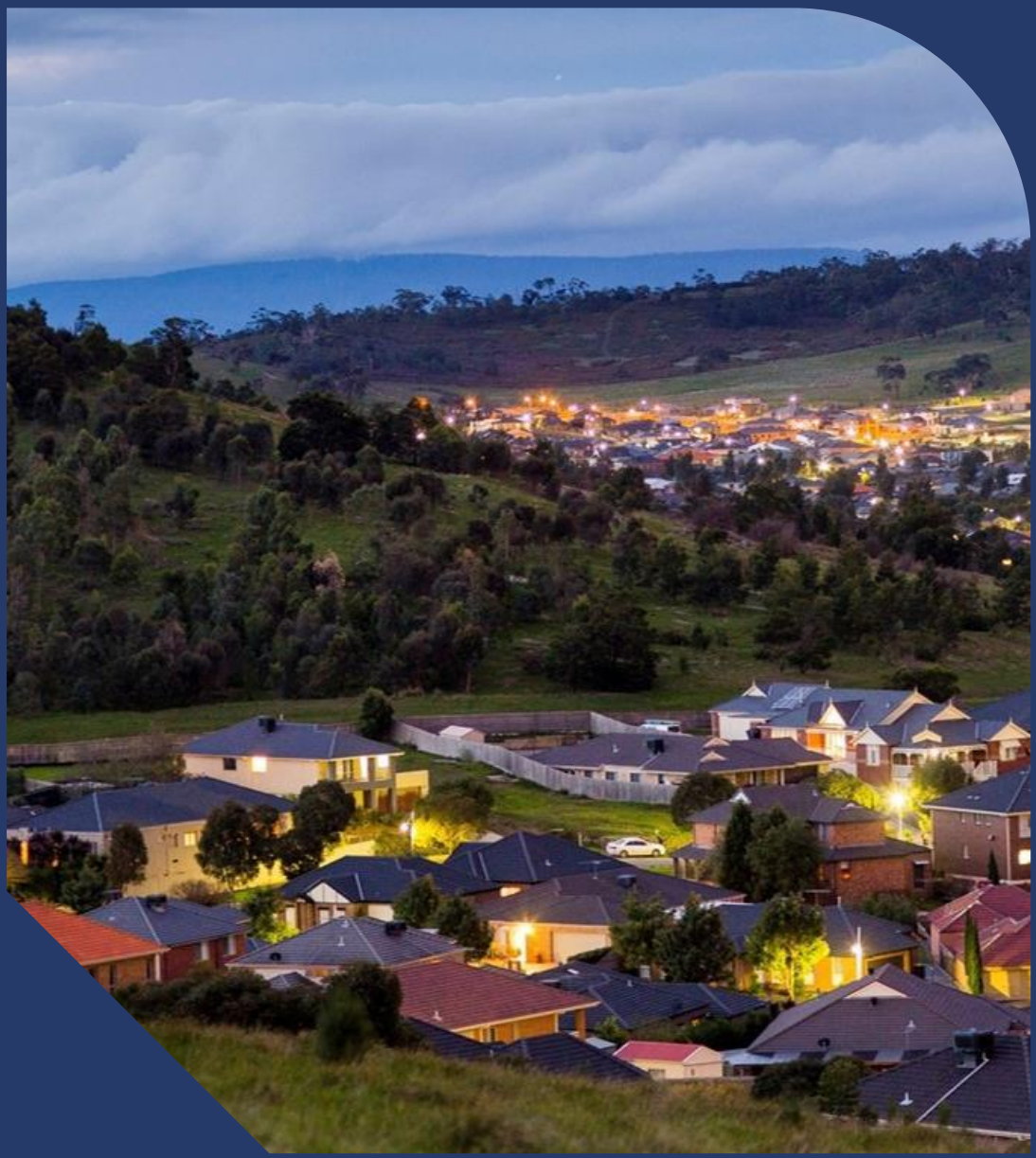
AusNet

Connection Enablement: Morwell East Area

Regulatory Investment Test for Distribution (RIT-D)

Options Screening Report

Wednesday, 31 January 2024



AusNet

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1. Executive summary

AusNet is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 809,000 customers. Our electricity distribution network covers eastern rural Victoria and the fringe of the northern and eastern Melbourne metropolitan area.

As expected by our customers and required by the various regulatory instruments under which we operate, AusNet aims to maintain service levels at the lowest possible cost to our customers. To achieve this, we develop plans that aim to maximise the present value of economic benefit to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

AusNet has received connection inquiries to connect a total of 1360 MW of renewable generation to the Morwell East sub-transmission (66 kV) network. The Morwell East sub-transmission network already has 123.1 MW of connected generation. Originally AusNet's sub-transmission network was planned to supply the electricity demand, rather than accommodate renewable generation. The Morwell East sub-transmission network was planned, built, and maintained to meet the demand in that area and is not strong enough to connect significant additional renewable generation.

The Regulatory Investment Test for Distribution (RIT-D) is an economic cost-benefit test used to assess and rank potential investments capable of meeting an identified need. The purpose of the RIT-D is to identify the credible option that meets the identified need and maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the NEM (the preferred option).

AusNet is initiating this RIT-D to investigate and evaluate options to address the constraints in the MWTS East sub-transmission network which are restricting new renewable generation connections. Publication of this Options Screening Report (OSR) represents the first step in the RIT-D process in accordance with clause 5.17 of the National Electricity Rules (NER) and section 4.2 of the RIT-D Application Guidelines[1].

AusNet proposes to investigate and evaluate the following network options to address the identified need:

1. Augment MWTS – TGN No.1 line with 19/3.25 AAC conductor
2. Augment MWTS – TGN No.1 line with 19/4.75 AAC conductor
3. Augment both MWTS - TGN lines with 37/3.75 AAC conductor

AusNet welcomes written submissions on the credible options presented in this OSR and invites proposals from proponents of potential non-network options (stand-alone or in conjunction with a network solution) that meet the identified need. Any credible non-network options will be assessed alongside the network options at the next stage of the RIT-D.

Submissions should be emailed to ritdconsultations@ausnetservices.com.au on or before 1 May 2024. In the subject field, please reference 'RIT-D OSR CE Morwell East'. AusNet's preference is that these submissions would be published on its website and AEMO's website. If you do not want your submission to be made public, please clearly stipulate this at the time of lodgement.

Assessments of the options and responses to this OSR will be presented in the Draft Project Assessment Report (DPAR), which we expect to publish before the end of May 2024.

[1] Australian Energy Regulator, *"Application guidelines Regulatory investment test for distribution"*

2. Introduction

The RIT-D is an economic cost-benefit test used to assess and rank potential investments capable of meeting the identified need. The purpose of the RIT-D is to identify the credible option that maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the NEM (the preferred option).

The publication of this OSR represents the first step in the RIT-D process in accordance with clause 5.17 of the NER and section 4.2 of the AER's RIT-D Application Guidelines[2]. In accordance with those requirements, this document sets out:

- the identified need that AusNet is seeking to address, together with the assumptions used in identifying this need;
- a description of the credible network options that may address the identified need;
- the technical characteristics of each credible option;
- the classes of market benefits that AusNet considers are unlikely to be material, together with our reasoning;
- the estimated construction timetable and commissioning date; and
- the total indicative capital and maintenance costs for each option.

The appendix provides an overview of the RIT-D assessment and consultation process.

[2] Australian Energy Regulator, "*Application guidelines Regulatory investment test for distribution*", August 2022.

3. Background

Morwell Terminal Station (MWTS) 66 kV is the main source of supply for a major part of south-eastern Victoria including Gippsland. AusNet is responsible for planning the transmission connection and distribution network for this region.

MWTS 66 kV is supplied by two 150 MVA 220/66 kV transformers and one 165 MVA 220/66 kV transformer. Maximum demand at MWTS 66 kV typically occurs in summer. The station recorded a maximum demand of 452 MW (464 MVA) in early January 2013. The maximum demand on the station reached 422.3 MW (425 MVA) in winter 2022. The maximum demand period is usually quite short and coincides with a few weeks of peak tourism from Christmas to early January along the east coast of Victoria – however driven by unusually cool 2022/2023 summer conditions the maximum demand occurred in winter 2022. The maximum demand at MWTS 66 kV is forecast to increase over the ten-year planning horizon.

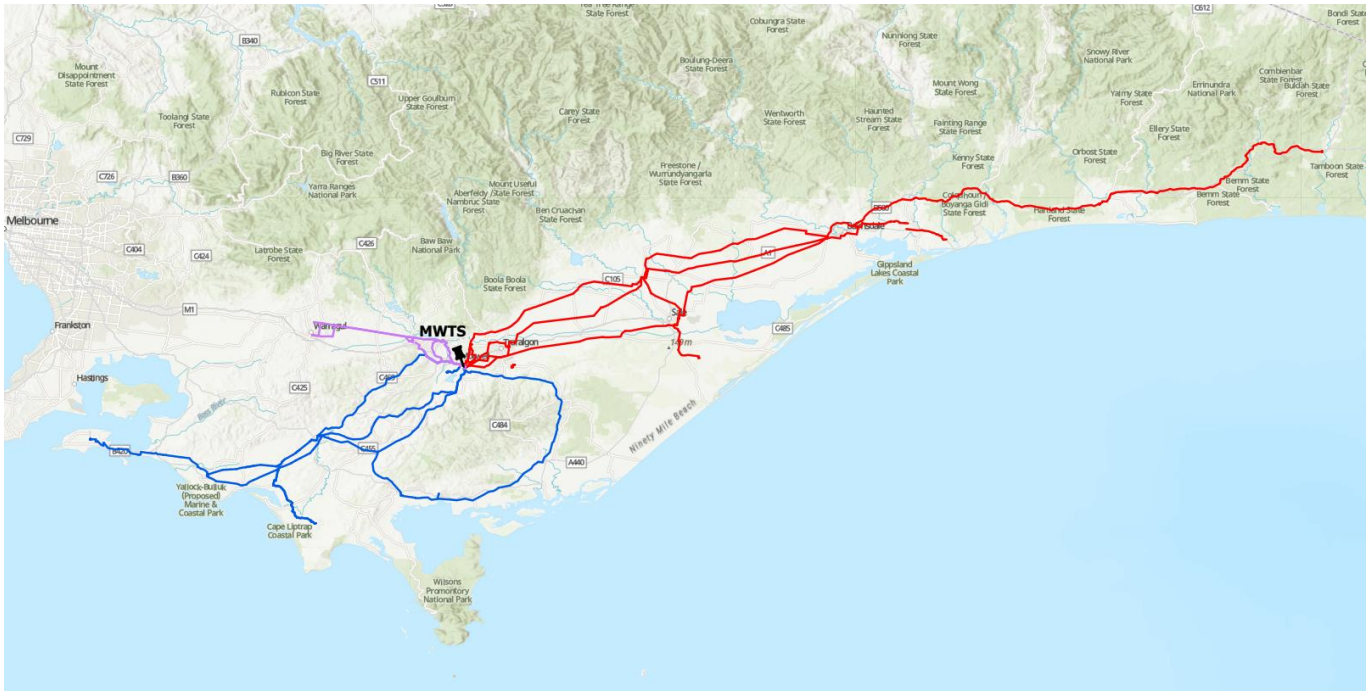

Figure 1: Map showing Morwell Terminal Station and the Morwell sub-transmission network

Morwell East network (shown in red) supplies Omeo in the north and Bairnsdale and Mallacoota in the east. Morwell South (shown in blue) supplies Phillip Island, Wonthaggi and Leongatha.

A total of 523.7 MW of embedded generation capacity is installed on the AusNet sub-transmission and distribution networks connected to MWTS[3]. It consists of:

- 277.4 MW of large-scale embedded generation; and
- 246.3 MW of rooftop solar PV, including all the residential and small-scale commercial rooftop PV systems that are smaller than 1 MW.

Of this connected generation to MWTS, Morwell East network has 123.1 MW of large-scale connected generation.

[3] 2023 Transmission Connection Planning Report (TCPR)

4. Identified need

4.1. Description

As mentioned above, there is already 123.1 MW of large-scale embedded generation connected to Morwell East network. AusNet has received connection inquiries to connect a total of 1360 MW of renewable generation to Morwell East sub-transmission (66 kV) system, including a 77 MW solar farm which is at the committed stage between MWTS - MFA and an 80 MW solar farm in advanced stage between MWTS – SLE.[4]

The East Gippsland 66 kV network, which emanates from Morwell Terminal Station (MWTS), supplies over 71,200 customers via six AusNet zone substations, including Traralgon (TGN), Sale (SLE), Maffra (MFA), Bairnsdale (BDL), Newmerella (NLA) and Cann River (CNR)[5]. The following diagram sourced from the Distribution Annual Planning Report (DAPR) – 2024-2028 shows the Morwell East sub-transmission network (constrained line segments under single order contingency are coloured in red).

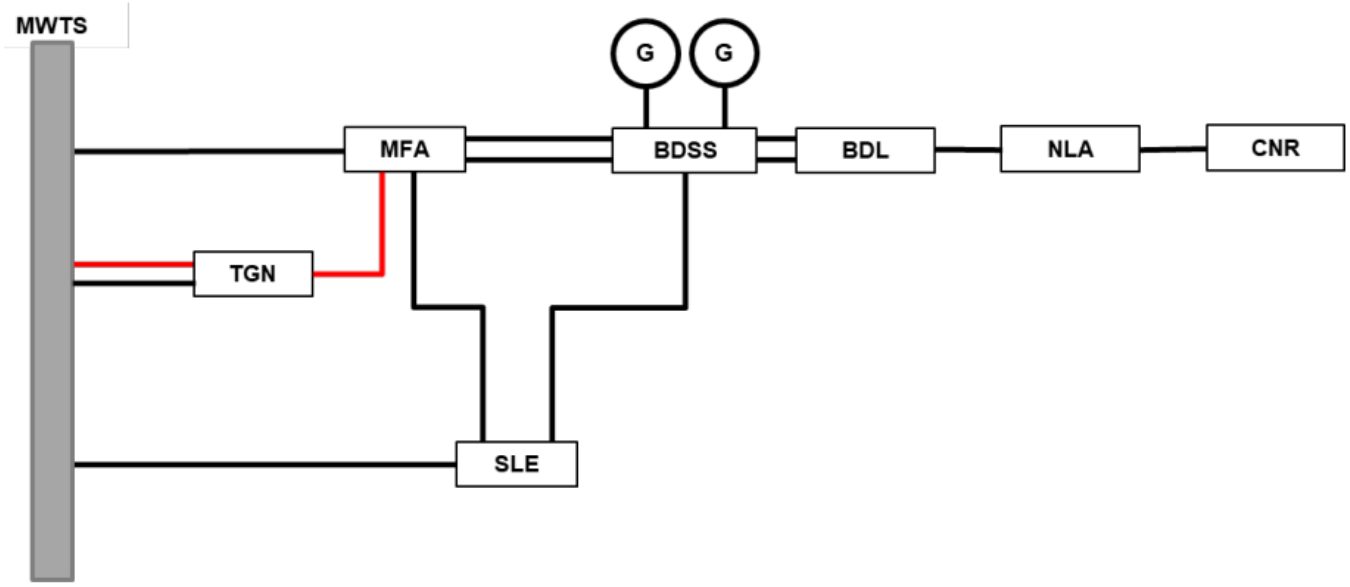

Figure 2: Morwell East sub-transmission network

As shown above, two 66 kV lines between MWTS and TGN are vital as a significant portion of the Morwell East is connected to MWTS through these two lines along with MWTS-MFA and MWTS-SLE lines. The MWTS-TGN No.1 line has a lower summer rating (39.44 MVA) constraining the No.2 line (with summer rating 91.45 MVA) operating in parallel. It is evident that the constraint of this portion is a major bottleneck for connecting new generation to the Morwell East network. The summer ratings of MWTS-MFA and MWTS-SLE lines are 73.73 MVA and 90.31 MVA respectively.

Through preliminary studies AusNet found that only a portion of the proposed generation connections could be accommodated by the existing assets, and the output of the connected generation would have to be curtailed during peak generation due to the existing constraints of the network.

The identified need of this RIT-D is therefore to address the constraints between MWTS - TGN sub-transmission section (approximately 19 km) to enable more renewable generation to connect to AusNet's sub-transmission and distribution network in Morwell East network.

4.2. Assumptions

The identified need described in the previous section is underpinned by a number of assumptions, including the projected growth in renewable generation given the connection inquiries received; the risk of asset failure (determined by the condition of the assets); and the likelihood of the relevant consequences. In addition to these assumptions, further assumptions will be required to quantify the costs and benefits of options to address the

[4] Latest information is available at Subtransmission Ratings and Connections dashboard
[5] AusNet Distribution Annual Planning Report (DAPR) – 2024-2028

identified need. These assumptions are outlined below, noting that our detailed assessment will be provided in the DPAR.

4.2.1. Market impact costs

Using market modelling, AusNet will estimate the market impact for each option, which consists of reduced generation cost due to replacing higher cost fossil fuel generation by low-cost renewable generation and reduced carbon emissions. The cost of curtailing exports from renewable generation will be considered in the market impact analysis, which will reflect the estimate change in dispatch costs if these constraints are relieved. We note that the AER has published a methodology[6] that addresses the costs and benefits of increasing hosting capacity for rooftop solar, which has regard to the marginal costs of generation. While our approach to estimating the costs of curtailing grid scale renewable generation differs from this methodology, the principles underpinning both approaches are broadly aligned. Further assumptions made in estimating the market impact will be detailed in the DPAR.

4.2.2. Emission reduction costs

Greenhouse gas emissions would be reduced by replacing fossil fuel powered generation with renewable generation. AusNet will quantify the benefits from reductions in carbon emissions using an appropriate cost of carbon when the guidance is published by the AER[7].

4.2.3. Supply risk costs

In calculating the supply risk costs, AusNet estimates the expected unserved energy based on the most recent demand forecasts, and values this expected unserved energy with the latest AER Value of Customer Reliability (VCR)[8]. The VCR value applied is based on the sector values published by the AER and the composition of load, by sector, supplied from MWTS. The resulting estimate of the weighted VCR for affected customers is $44,100/MWh for MWTS 66 kV.

The total supply risk cost is calculated by estimating the impacts of different combinations of relevant forced outages to reliability of supply and weighting them by their probabilities of occurrence.

4.2.4. Safety risk costs

The Electricity Safety Act 1998[9] requires AusNet to design, construct, operate, maintain, and decommission its network to minimise hazards and risks to the safety of any person as far as reasonably practicable or until the costs become disproportionate to the benefits from managing those risks. By implementing this principle for assessing safety risks from asset failures, AusNet uses:

- a value of statistical life[10] to estimate the benefits of reducing the risk of death;
- a value of lost time injury[11]; and
- a disproportionality factor[12].

AusNet's approach, including the use of a disproportionality factor, is consistent with the guidance provided by the AER.

4.2.5. Financial risk costs

In the event of an asset failure, costs will be incurred in replacing the failed assets (and any consequential damage to other assets). The risk of this financial impact may vary for different credible options and, therefore, should be factored into the cost-benefit assessment.

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[6] Customer export curtailment value methodology | Australian Energy Regulator (aer.gov.au)
[7] https://www.aer.gov.au/communication/aer-releases-guidance-on-amended-national-energy-objectives
[8] In dollar terms, the Value of Customer Reliability (VCR) represents a customer's willingness to pay for the reliable supply of electricity. The values produced are used as a proxy, and can be applied for use in revenue regulation, planning, and operational purposes in the National Electricity Market (NEM).
[9] Victorian State Government, Victorian Legislation and Parliamentary Documents, "*Electricity Safety Act 1998,*" available at Electricity Safety Act 1998 (legislation.vic.gov.au)
[10] Department of the Prime Minister and Cabinet, Australian Government, "*Best Practice Regulation Guidance Note: Value of statistical life,*" available at https://www.pmc.gov.au/resource-centre/regulation/best-practice-regulation-guidance-note-value-statistical-life
[11] Safe Work Australia, "The Cost of Work-related Injury and Illness for Australian Employers, Workers and the Community: 2012-13," available at https://www.safeworkaustralia.gov.au/system/files/documents/1702/cost-of-work-related-injury-and-disease-2012-13.docx.pdf
[12] Health and Safety Executive's submission to the1987 Sizewell B Inquiry suggesting that a factor of up to 3 (i.e., costs three times larger than benefits) would apply for risks to workers; for low risks to members of the public a factor of 2, for high risks a factor of 10. The Sizewell B Inquiry was public inquiry conducted between January 1983 and March 1985 into a proposal to construct a nuclear power station in the UK.

5. Potential Credible Options

This section describes the credible options that have been considered to address the identified need, including:

- the technical characteristics of each option;
- the estimated construction timetable and commissioning date; and
- the total indicative capital and operating and maintenance costs.

The purpose of the RIT-D is to identify the credible option for addressing the identified need that maximises the net market benefit. An important aspect of this task is to consider non-network and network options on an equal footing, so that the optimal solution can be identified.

None of the options considered are expected to have an inter-regional impact. Each credible option is discussed below, including the Do Nothing/BAU option.

5.1. Option 0: Do Nothing/BAU

The Do Nothing/BAU option assumes that AusNet would not undertake any investment, outside of the normal operational and maintenance processes. The Do Nothing/BAU (Business as Usual) option establishes the base level of risk (base case) and provides a basis for comparing other credible options.

5.2. Option 1: Augment No.1 line with 19/3.25 conductor

The existing summer rating of the No.1 MWTS – TGN 66 kV line is 39.44 MVA. This option includes replacing the lower rated line sections with higher rated 19/3.25 AAC conductor to increase the overall line summer rating to 64 MVA. This option is expected to increase the summer rating of both lines from 79 MVA (39.44 x 2) to 128 MVA (64 x 2). However, this option will not be able to utilise the full summer rating of the No.2 line as the augmented capacity of No. 1 line will remain below the summer rating of No.2 line (91.45 MVA).

The construction would commence in August 2024, with project completion expected by December 2026. The estimated capital cost of this option is $3.99 million.

In relation to O&M expenditure, AusNet does not expect this option to have a material impact on future O&M costs i.e., routine maintenance expenditure would be substantially unchanged.

5.3. Option 2: Augment No.1 line with 19/4.75 conductor

The existing summer rating of the No.1 MWTS – TGN 66 kV line is 39.44 MVA. This option includes replacing the lower rated line sections with higher rated 19/4.75 AAC conductor to increase the overall line summer rating to 105 MVA. This option is expected to increase the summer rating of both lines from 79 MVA (39.44 x 2) to 183 MVA (91.45 x 2). This option would utilise the full summer rating of the No.2 line as the summer rating of the augmented No.1 would be higher than the No.2 line.

The construction would commence in August 2024, with project completion expected by December 2026. The estimated capital cost of this option is $4.11 million.

In relation to O&M expenditure, AusNet does not expect this option to have a material impact on future O&M costs.

5.4. Option 3: Augment both lines with 37/3.75 conductor

This option is similar to Option 2 above, the only difference being replacing both lines with 37/3.75 AAC conductor. When replacing an existing line with a higher rated conductor, most of the poles will have to be replaced with new poles due to the higher weight of the conductor. This augmentation would increase the summer rating of each line to 118 MVA making the new overall MWTS – TGN summer rating to 236 MVA (118 x 2)

The construction would commence in August 2024, with project completion expected by December 2026. The estimated capital cost of this option is $20.79 million.

In relation to O&M expenditure, AusNet does not expect this option to have a material impact on future O&M costs.

5.5. Options considered and not progressed

Augmenting the No.1 line with 37/3.75 AAC conductor was initially considered but did not progress further. In the absence of augmenting the No.2 line, this option would not provide any additional benefit compared to Option 2 (augmenting No.1 line with 19/4.75 AAC) as MWTS – TGN No.1 and No.2 lines are operating in parallel. This option, however, would have a higher cost than Option 2. On that basis, this option would be inferior to Option 2.

In this case the augmented No.1 line would have a summer rating of 118 MVA but the summer rating of No.2 line stays the same at 91.45 MVA as the constraining element.

5.6. Material inter-regional network impact

The proposed augmentations between MWTS - TGN will not change the transmission network configuration and none of the network options considered are likely to have a material inter-regional network impact. A 'material inter-regional network impact' 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."

6. Non-network options

This section outlines:

- The technical characteristics that a non-network option would be required to deliver;
- The estimated maximum deferred augmentation charge that would be available to pay for the non-network service; and
- The information that a non-network proponent should provide to AusNet to explore the potential provision of a non-network service.

6.1. Required technical characteristics of a non-network option

The table below sets out the curtailment reductions that a non-network option placed preferably at Traralgon connecting to Traralgon Zone Substation would be required to deliver. The non-network option would mitigate the risks associated with the curtailed renewable generation from existing generators in the East Gippsland loop and from new generation connecting to Traralgon zone substation due to the constraints between MWTS – TGN sub-transmission section. The information presented provides an indication of the required operating profile, noting that prospective non-network service providers may not be able to exactly match these requirements.

Table 1: Service requirements for a non-network option

Year (FY)	Total Curtailment Relief (GWh)	Total Hours of Curtailment Relief	Maximum Duration of Curtailment Relief (hours)	Total Amount of Curtailment Relief During Maximum Duration Event (MWh)	Average Daily Hours of Curtailment Relief	Average Daily Curtailment Relief (MWh)
2027	41.40	1359	24	1065.93	3.72	113.42
2028	44.85	1497	24	922.17	4.09	122.53
2029	37.39	1420	24	874.19	3.89	102.45
2030	46.08	1380	24	1176.36	3.78	126.24
2031	37.23	1350	24	831.32	3.70	101.99
2032	37.22	1339	24	802.25	3.66	101.71
2033	45.44	1431	24	1201.57	3.92	124.51
2034	47.37	1393	24	1200.04	3.82	129.77

6.2. Power system security, reliability and fault levels

A non-network option must be capable of reliably reducing curtailed generation under a range of conditions and scenarios. The non-network solution will contribute to system security and reliability to the extent that it addresses the risks arising from the identified need. The non-network option is not required to address any existing issues in relation to fault levels.

If the non-network option is an inverter-based generator operating in parallel with AusNet network, the generator must comply with the requirements set out in document SOP 33-05 and other connection requirements which are set out in AusNet Services' embedded generator connections page.

6.3. Guidance on potentially feasible options

The following non-network solutions are likely to be potentially feasible options to address the identified need:

- New embedded energy storage systems or load connections;
- Modifications to existing customer generation to include embedded energy storage systems; and
- Modifications to existing load connections to increase load capacity.

Without limiting the potential for non-network solutions, the following types of non-network options are unlikely to be feasible:

- Renewable generation not coupled with storage or dispatchable generation; and
- Unproven, experimental or undemonstrated technologies.

6.4. Information to be included in non-network solution proposals

Non-network service providers interested in alleviating the network constraints outlined above are advised to begin engagement with AusNet as soon as possible. A detailed proposal including the information listed below should be submitted by the requested date.

Details required include:

- Name, address and contact details of the person making the submission.
- Name, address and contact details of the person responsible for non-network support (if different to above).
- A detailed description of the services to be provided, including:
  - Size and capacity (MW/MVA/MWh).
  - Location(s).
  - Frequency and duration.
  - Type of action or technology proposed, including response / ramp rate information, where applicable.
  - Proposed dispatching arrangement (e.g. telephone, web-based trigger, automated means via RTU).
  - Availability and reliability performance details.
  - Period of notice required to enable dispatch of non-network support (e.g. to allow time for charging of energy storage solutions or market-based limitations).
  - Proposed contract period and staging (if applicable).
  - Proposed timing for delivery (including timeline to plan and implement the proposal).
- High-level electrical layout of the proposed site (if applicable).
- Evidence and track record proving capability and previous experience in implementing and completing projects of the same type as the proposal.
- Preliminary assessment of the proposal's impact on the network.
- Breakdown of the lifecycle costs for providing the service, including:

  - Capital costs (if applicable).
  - Annual operating (i.e. set up and dispatch fees) and maintenance costs.
  - Other costs (e.g. availability, project establishment, etc.).
  - Tariff assumptions.
  - Expected annual payment for providing the non-network solution.
- A method outlining measurement and quantification of the agreed service, including integration of the proposed solution with the network.
- A statement outlining that the non-network service provider is prepared to enter into a Network Support Agreement (NSA) (subject to agreeing terms and conditions).
- Letters of support from partner organisations.
- Any special conditions to be included in an NSA.

All proposals must satisfy the requirements of any applicable laws, rules, and the requirements of any relevant regulatory authority, including following the normal network connection processes where applicable. Any network reinforcement costs required to accommodate the non-network solution will typically be borne by the proponent of the non-network solution.

For further details on AusNet's process for engaging and consulting with non-network service providers, and for investigating, developing, assessing and reporting on non-network options as alternatives to network augmentation, please refer to the Non-Network Solutions and Demand Management webpages, which contain the Demand Side Engagement Strategy and other relevant demand management documentation:

https://www.ausnetservices.com.au/Electricity

6.5. Potential payments to non-network proponents

The maximum amount that AusNet would be willing to pay for a non-network solution would depend on the value that it provides in terms of risk reduction.

At this stage, the preferred network option has not yet been determined. As a consequence, the total capital expenditure that could be deferred by engaging a non-network solution and, therefore, an estimate of the annual payment available to a non-network proponent cannot be provided.

The payment for a non-network solution may vary according to availability, capacity, dispatch duration and firmness of the non-network service, and the responses received from other non-network proponents. The actual payment to a non-network proponent will also be subject to negotiation.

AusNet welcomes the submission of non-network option proposals for review of the potential payment amount on a case-by-case basis. For more information or enquiries regarding non-network solutions to address the identified need, please contact ritdconsultations@ausnetservices.com.au. In the subject field, please reference 'RIT-D OSR CE Morwell East'.

7. Next steps

7.1. Request for submissions

AusNet invites written submissions, on the matters set out in this OSR, from Registered Participants, AEMO, interested parties, non-network providers and those registered on our demand-side engagement register.

All submissions and enquiries should be directed to:

Email: ritdconsultations@ausnetservices.com.au

Submissions are due on or before 1 May 2024 and should refer to 'RIT-D OSR CE Morwell East' in the subject heading.

Submissions will be published on AusNet's and AEMO's websites. If you do not wish to have your submission published, please clearly stipulate this at the time of lodging your submission.

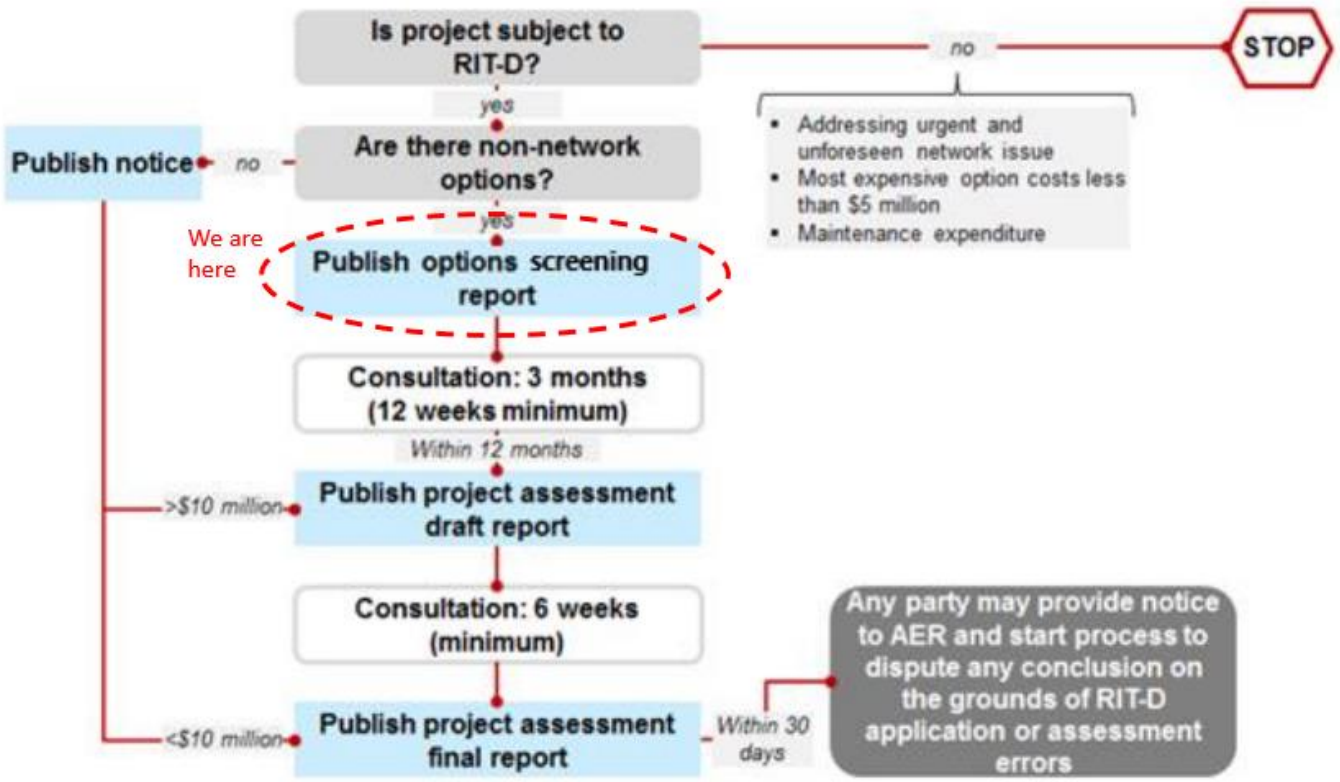
7.2. Next stage of RIT-D process

Following the conclusion of the consultation period for this report, AusNet will, having regard to any submissions received, prepare and publish the DPAR which will include:

- A summary of, and commentary on, any submissions on this OSR.
- A detailed market benefit assessment of the proposed credible options to address the identified need.
- Identification of the proposed preferred option to meet the identified need.

AusNet expects to publish the DPAR before the end of May 2024.

Appendix – RIT-D assessment and consultation process[13]



[13] Section 4 - Australian Energy Regulator, *"Application guidelines Regulatory investment test for distribution"* August 2022

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