

# **Service constraints at Benalla (BN) Zone Substation**

**RIT-D Stage 1: Non-network options report**



**ISSUE/AMENDMENT STATUS**

Issue	Date	Description	Author	Approved
1	29/03/2021	First Issue	F. Dinh	T. Langstaff

**Disclaimer**

This document belongs to AusNet Services and may or may not contain all available information on the subject matter this document purports to address.

The information contained in this document is subject to review and AusNet Services may amend this document at any time. Amendments will be indicated in the Amendment Table, but AusNet Services does not undertake to keep this document up to date.

To the maximum extent permitted by law, AusNet Services makes no representation or warranty (express or implied) as to the accuracy, reliability, or completeness of the information contained in this document, or its suitability for any intended purpose. AusNet Services (which, for the purposes of this disclaimer, includes all of its related bodies corporate, its officers, employees, contractors, agents and consultants, and those of its related bodies corporate) shall have no liability for any loss or damage (be it direct or indirect, including liability by reason of negligence or negligent misstatement) for any statements, opinions, information or matter (expressed or implied) arising out of, contained in, or derived from, or for any omissions from, the information in this document.

**Contact**

This document is the responsibility of AusNet Services.

Please contact the indicated owner of the document with any inquiries.

Fuji Dinh  
AusNet Services  
Level 30, 2 Southbank Boulevard  
Southbank, Victoria 3006  
Ph: (03) 9695 6000

## Table of Contents

<b>1</b>	<b>Executive Summary</b> .....	<b>5</b>
1.1	Identified Need.....	5
1.2	Potential credible options.....	5
1.3	Submissions.....	6
1.4	Next steps.....	6
<b>2</b>	<b>Introduction</b> .....	<b>7</b>
<b>3</b>	<b>Background</b> .....	<b>8</b>
3.1	Existing network.....	8
3.2	Customer Composition.....	9
3.3	Zone Substation Equipment.....	10
3.3.1	Primary Equipment.....	10
3.3.2	Secondary Equipment.....	10
<b>4</b>	<b>Identified Need</b> .....	<b>12</b>
<b>5</b>	<b>Assumptions underpinning the identified need</b> .....	<b>13</b>
5.1	Regulatory Obligations.....	13
5.2	Asset Condition.....	14
5.3	Zone Substation Supply Capacity.....	15
5.4	Load Duration Curves.....	15
5.5	Feeder Circuit Supply Capacity.....	16
5.6	Load Transfer Capability.....	16
5.7	Station Configuration Supply Risk.....	17
<b>6</b>	<b>Potential Credible Options</b> .....	<b>18</b>
6.1	Option 1: Do Nothing.....	18
6.2	Option 2: Retire one transformer.....	18
6.3	Option 3: Retire one transformer and reduce residual risk through network support.....	18
6.4	Option 4: Network support to defer replacement.....	19
6.5	Option 5: Replace 66kV circuit breakers and poor condition 22kV circuit breakers.....	19
6.6	Option 6: Replace 66kV circuit breakers and all 22kV circuit breakers.....	19
6.7	Option 7: Replace 66kV and 22kV circuit breakers and form a ring bus.....	19
<b>7</b>	<b>Requirements for non-network option</b> .....	<b>20</b>
7.1	Load reduction and location.....	20
7.2	Power system security, reliability and fault levels.....	21
7.3	Timing and operating profile.....	21
7.4	Guidance on potentially feasible options.....	22
7.5	Data requirements from non-network service providers.....	23
7.6	Potential payments to non-network proponents.....	24
<b>8</b>	<b>Next Steps</b> .....	<b>25</b>
8.1	Request for submissions.....	25

---

**Service constraints at BN – Non-network options report**

---

8.2 Next stage of RIT-D process..... 25

## 1 Executive Summary

AusNet Services is a regulated Victorian Distribution Network Service Provider (DNSP) that supplies electrical distribution services to more than 745,000 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 that we operate under, AusNet Services aims to maintain service levels at the lowest possible cost to our customers. To achieve this, we develop forward looking 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).

Our planning approach includes the application of a probabilistic planning methodology, under which conditions often exist where some of the load cannot be supplied under rare but possible conditions, such as during extreme demand conditions or with a network element out of service. Where relevant, we also prepare, publish, and consult on a regulatory investment test for distribution (RIT-D), which further helps ensure all credible options are identified and considered, and the best option is selected.

This non-network options report is stage one of the RIT-D consultation process to address the existing and emerging service level constraints in the Benalla (BN) Zone Substation supply area. The report has been prepared by AusNet Services in accordance with the requirements of clause 5.17 of the National Electricity Rules (NER).

### 1.1 Identified Need

BN was first established in the 1940s and consists of three 10/13.5 MVA 66/22kV transformers supplied from two 66kV lines emanating from Glenrowan Terminal Station (GNTS). It has a third 66 kV line that radially supplies Mansfield (MSD) Zone Substation.

The station has mixture of bulk oil and vacuum circuit breakers and the physical and electrical condition of some assets has deteriorated and they are now presenting an increased failure risk.

The emerging service constraints at BN are:

- Security of supply risks presented by the increasing likelihood of asset failure due to the condition of the assets;
- Health and safety risks presented by a possible explosive failure of the bushings on a number of the assets;
- Plant collateral damage risks presented by a possible explosive failure of bushings on a number of assets;
- Environmental risks associated with insulating oil spill or fire; and
- Reactive asset replacement risks presented by the increasing likelihood of asset failure due to the deteriorating condition of the assets.

### 1.2 Potential credible options

The potential credible options that AusNet Services believes may be capable of meeting the identified need include:

1. Do nothing
2. Retire one transformer
3. Retire one transformer and reduce residual risk through network support
4. Network support to defer retirement and replacement

---

## Service constraints at BN – Non-network options report

---

5. Replace 66kV circuit breakers and poor condition 22kV circuit breakers
6. Replace 66kV circuit breakers and all 22kV circuit breakers
7. Replace 66kV circuit breakers and form a ring bus and all 22kV circuit breakers

### 1.3 Submissions

AusNet Services invites written submissions on the matters set out in this non-network options report 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:

Fuji Dinh  
Senior Engineer – Strategic Network Planning  
AusNet Services  
Email: [ritdconsultations@ausnetservices.com.au](mailto:ritdconsultations@ausnetservices.com.au)

Submissions are due on or before 21 July 2021.

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

### 1.4 Next steps

Following conclusion of the non-network options report consultation period, AusNet Services will, having regard to any submissions received on this non-network options report, prepare and publish a draft project assessment report (DPAR). AusNet Services intends to publish the DPAR by Q3 2021.

## **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).

This non-network options report is the first stage of the RIT-D consultation process in relation to the existing and emerging service level constraints in the BN supply area. This report has been prepared by AusNet Services in accordance with the requirements of clause 5.17 of the NER.

This report:

- Describes the identified need that AusNet Services is seeking to address, in relation to the service level constraints in the BN Zone Substation supply area.
- Outlines the assumptions made in identifying the need.
- Describes the options that AusNet Services considers could potentially address the identified need.
- Outlines the technical characteristics that a non-network option would be required to deliver to meet the identified need.
- Invites registered participants, AEMO, interested parties, non-network providers and persons on AusNet Services' demand side engagement register to make a submission on this non-network options report.

### 3 Background

#### 3.1 Existing network

BN is located approximately 212 km north-east of Melbourne and is the main source of supply for the rural towns of Benalla, Euroa, Lima South, Tatong, and Goornbat townships.

BN supplies approximately 12,100 AusNet Services' customers. The customer base supplied from BN is predominately made up of residential (66%) and farming (24%), with some commercial and industrial.

The Benalla zone substation supply area is to the north-east of Melbourne, and is at an elevation of 170 m above sea level.

BN has typical Melbourne climate with summer average maximum temperatures of 30°C, winter average minimum temperatures of 4°C with extreme temperatures reaching 43.5°C in summer and -4.5°C in winter.

The average annual rainfall is 670mm in this area.

BN is supplied at 66kV via two 66kV circuits that originate from Glenrowan Terminal Station (GNTS).

The location of BN within the AusNet Services distribution network is as shown in Figure 1.

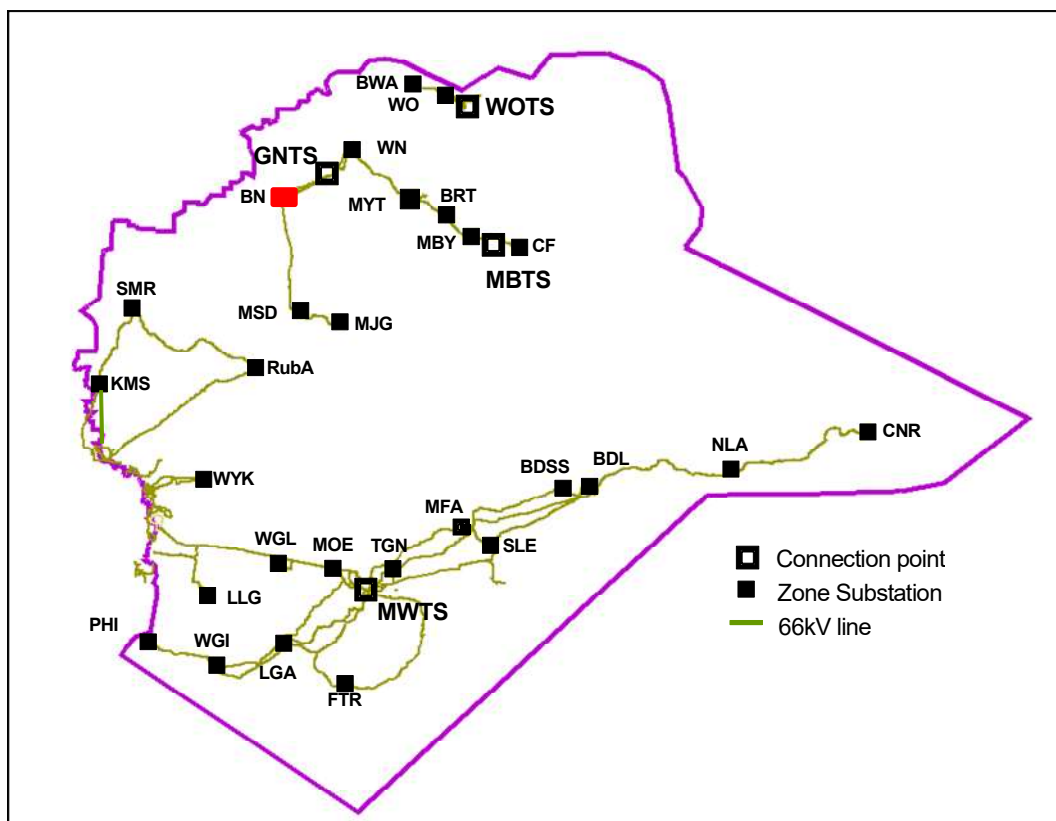


Figure 1: BN location within AusNet Services distribution network

The configuration of primary electrical circuits within BN is as shown in the single line diagram in Figure 2.



Service constraints at BN – Non-network options report

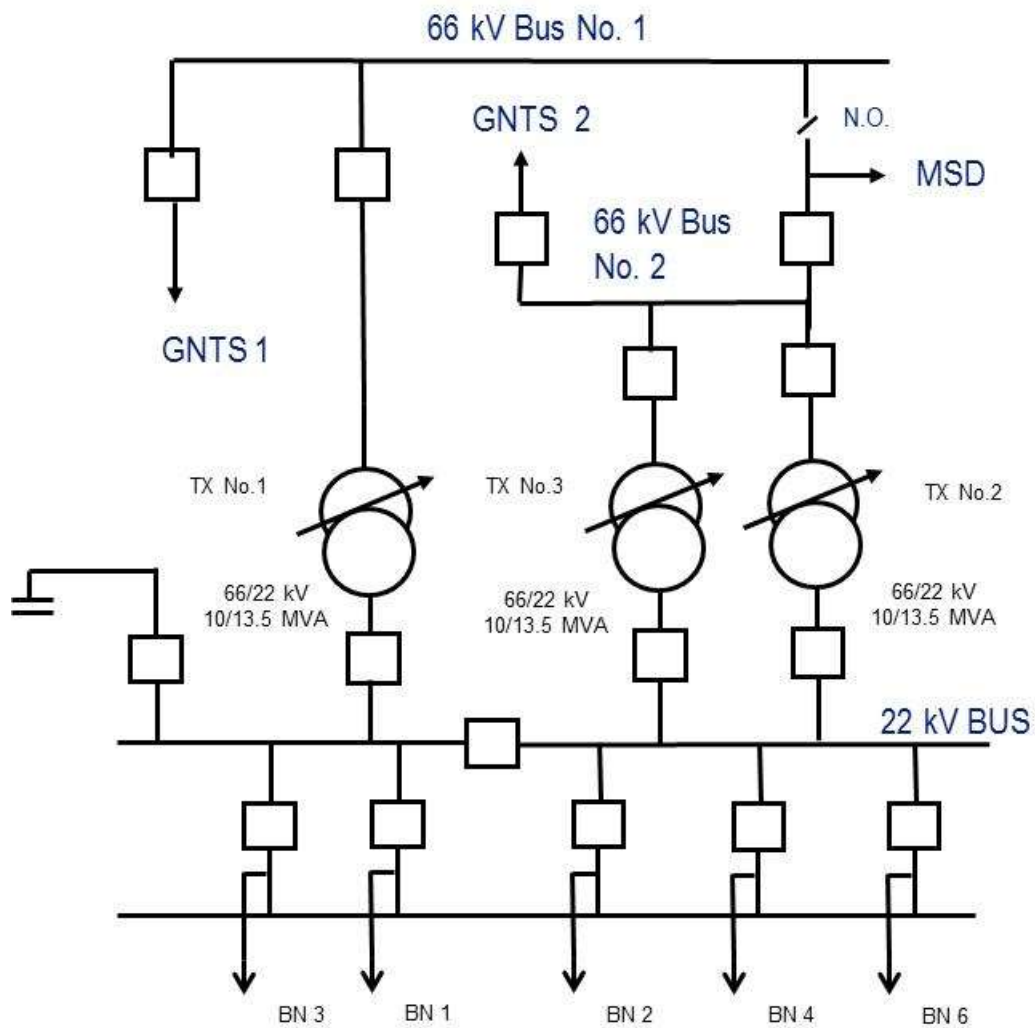


Figure 2: BN Single Line Diagram

3.2 Customer Composition

BN has five 22kV feeders of which supply into the AusNet Services supply area.

Table 1 provides details of the 22kV supply feeders.

Table 1: BN feeder information

Feeder	Feeder Length (km)	Feeder description	Number of Customers	Type of Customers
BN1	1206	Summer peaking, long rural feeder	4608	58.9% Residential 9.2% Commercial 1% Industrial 30.8% Farming
BN2	384	Summer peaking, long rural feeder	1084	47.5% Residential 14.2% Commercial 3.1% Industrial 35.2% Farming

## Service constraints at BN – Non-network options report

Feeder	Feeder Length (km)	Feeder description	Number of Customers	Type of Customers
BN3	153	Summer peaking, Short rural feeder	662	71.9% Residential 3.9% Commercial 1.2% Industrial 23.0% Farming
BN4	19	Summer Peaking, urban, feeder	3381	87.6% Residential 11.6% Commercial 0.7% Industrial 0.1% Farming
BN6	506	Summer peaking, long rural feeder	2355	63.2% Residential 4.9% Commercial 0.8% Industrial 31.1% Farming

There is minimal inter-connecting 22kV feeders between Benalla Zone Substation and its adjacent .

### 3.3 Zone Substation Equipment

#### 3.3.1 Primary Equipment

BN includes an air-insulated 66kV switchyard with two 66kV buses separated by bus-tie circuit breakers connected to two incoming 66kV lines from GNTS and one outgoing to MSD ZS. The switching is done by six AEI LGC4C bulk oil type 66 kV circuit breakers.

There are two 22kV air insulated busbars connected to one another with a bus-tie circuit breaker and connected to the three 66/22kV transformers via three transformer circuit breakers. Five 22kV feeders and one 6MVar capacitor bank are connected to these 22kV busbars.

The 22kV switchyard currently has three EMAIL 345GC type 22kV bulk oil circuit breakers and one OMT2/3 type 22 kV bulk oil type circuit breaker, all of which are in C5 condition. There are also four 22 kV vacuum type circuit breakers, which have mechanical problems.

Transformation comprises of three 10/13.5MVA 66/22kV transformers. The No.1 and No.2 units were manufactured by Tyree, and the No.3 unit was manufactured by English Electric. All the transformers are in C3 condition and were installed at BN zone substation in the late 1960s to early 1970s.

#### 3.3.2 Secondary Equipment

The three incoming 66kV lines and two buses are protected by current distance and remote trip send and directional overcurrent protection using modern SEL 311C and GE D30 relays.

The No.1 and No.2 66/22kV transformer differential protection is provided by older RYDSA relays whilst the newer No.3 transformer differential protection is provided by modern ABB D202 relays.

The 22kV bus protection consists of distance bus protection and differential protection using GEC CDG14 and GE D30 relays.

The 22kV feeder circuit breakers have master earth fault and back up earth fault protection using GE F35 and GE F650 relays.

The 22kV capacitor bank protection has overcurrent, earth fault and voltage balance schemes using a GE F650 relay.

**Service constraints at BN – Non-network options report**

---

The station has duplicated 24V AC systems and battery chargers that supply a 250V DC system for protection relays and trip coils.

## **4 Identified Need**

BN commenced operation as a 66/22kV transformation station over 40 years ago in the late 1960s with three power transformers. BN is supplied at 66kV via two 66kV circuits that originate from Glenrowan Terminal Station (GNTS). There is one outgoing 66 kV line to MSD Zone Substation.

The station has mixture of bulk oil and vacuum circuit breakers and the physical and electrical condition of some of these assets has deteriorated and they are now presenting an increasing failure risk

The emerging service constraints at BN are:

- Security of supply risks presented by the increasing likelihood of asset failure due to the condition of the assets;
- Health and safety risks presented by a possible explosive failure of the bushings on a number of the assets
- Plant collateral damage risks presented by a possible explosive failure of bushings on a number of assets
- Environmental risks associated with insulating oil spill or fire; and
- Reactive asset replacement risks presented by the increasing likelihood of asset failure due to the deteriorating condition of the assets.

## 5 Assumptions underpinning the identified need

The purpose of this chapter is to summarise the key input assumptions that underpin the identified need described in the previous chapter.

### 5.1 Regulatory Obligations

In addressing the identified need, we must satisfy our regulatory obligations, which we summarise below.

Clause 6.5.7 of the National Electricity Rules requires AusNet Services to only propose capital expenditure required in order to achieve each of the following:

- (1) *meet or manage the expected demand for standard control services over that period;*
- (2) *comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;*
- (3) *to the extent that there is no applicable regulatory obligation or requirement in relation to:*
  - (i) *quality, reliability or security of supply of standard control services; or*
  - (ii) *the reliability or security of the distribution system through the supply of standard control services**to the relevant extent:*
  - (iii) *maintain the quality, reliability and security of supply of standard control services, and*
  - (iv) *maintain the reliability and security of the distribution system through the supply of standard control services; and*
- (4) *maintain the safety of the distribution system through the supply of standard control services.*

Section 98(a) of the Electricity Safety Act requires AusNet Services to:

*design, construct, operate, maintain and decommission its supply network to minimise as far as practicable –*

- (a) *the hazards and risks to the safety of any person arising from the supply network; and*
- (b) *the hazards and risks of damage to the property of any person arising from the supply network; and*
- (c) *the bushfire danger arising from the supply network.*

The Electricity Safety act defines ‘practicable’ to mean having regard to –

- (a) *severity of the hazard or risk in question; and*
- (b) *state of knowledge about the hazard or risk and any ways of removing or mitigating the hazard or risk; and*
- (c) *availability and suitability of ways to remove or mitigate the hazard or risk; and*
- (d) *cost of removing or mitigating the hazard or risk.*

Clause 3.1 of the Electricity Distribution Code requires AusNet Services to:

- (b) *develop and implement plans for the acquisition, creation, maintenance, operation, refurbishment, repair and disposal of its distribution system assets and plans for the establishment and augmentation of transmission connections:*

## Service constraints at BN – Non-network options report

- (i) to comply with the laws and other performance obligations which apply to the provision of distribution services including those contained in this Code;
- (ii) to minimise the risks associated with the failure or reduced performance of assets; and
- (iii) in a way which minimises costs to customers taking into account distribution losses.

Under clause 5.2 of the Electricity Distribution Code, AusNet Services:

*must use best endeavours to meet targets required by the Price Determination and targets published under clause 5.1 and otherwise meet reasonable customer expectations of reliability of supply.*

### 5.2 Asset Condition

AMS 10-13 Condition Monitoring describes AusNet Services' strategy and approach to monitoring the condition of assets.

Asset condition is measured with reference to an asset health index on a scale of C1 to C5. Table 2 provides a description of the asset condition scores.

**Table 2: Asset condition Score and Remaining Service Potential**

Condition Score	Condition	Condition Description
C1	Very Good	Initial service condition
C2	Good	Deterioration has minimal impact on asset performance. Minimal short term asset failure risk.
C3	Average	Functionally sound showing some wear with minor failures, but asset still functions safely at adequate level of service.
C4	Poor	Advanced deterioration – plant and components function but require a high level of maintenance to remain operational.
C5	Very Poor	Extreme deterioration approaching end of life with failure imminent.

The condition of the key assets at BN is discussed in the Asset Health Reports for the key asset classes such as power transformers, instrument transformers and switchgear with information on asset condition rankings, recommended risk mitigation options and replacement timeframes. A summary of the asset condition at BN is provided in Table 3 and discussed in the following sections.

**Table 3: BN Asset Condition Summary**

Asset Type	Number of assets by Condition Score				
	C1	C2	C3	C4	C5
66kV Circuit Breakers					6
66kV Current Transformers	3				
66kV Voltage Transformers				2	
66/22kV Power Transformers			3		
22kV Circuit Breakers		2	4		5
22kV Current Transformers					3
22kV Voltage Transformers	1			2	

## Service constraints at BN – Non-network options report

These condition scores are then used to calculate the asset failure rates using the Weibull parameters determined for each asset class.

### 5.3 Zone Substation Supply Capacity

BN is a summer peaking station and the peak electrical demand reached 35.1MVA in summer 2019/20, and is forecast to grow slowly at approximately 0.4% per annum to 35.3MVA by 2024/25

Figure 3 shows the forecast maximum demand and supply capacities (cyclic ratings) for BN.

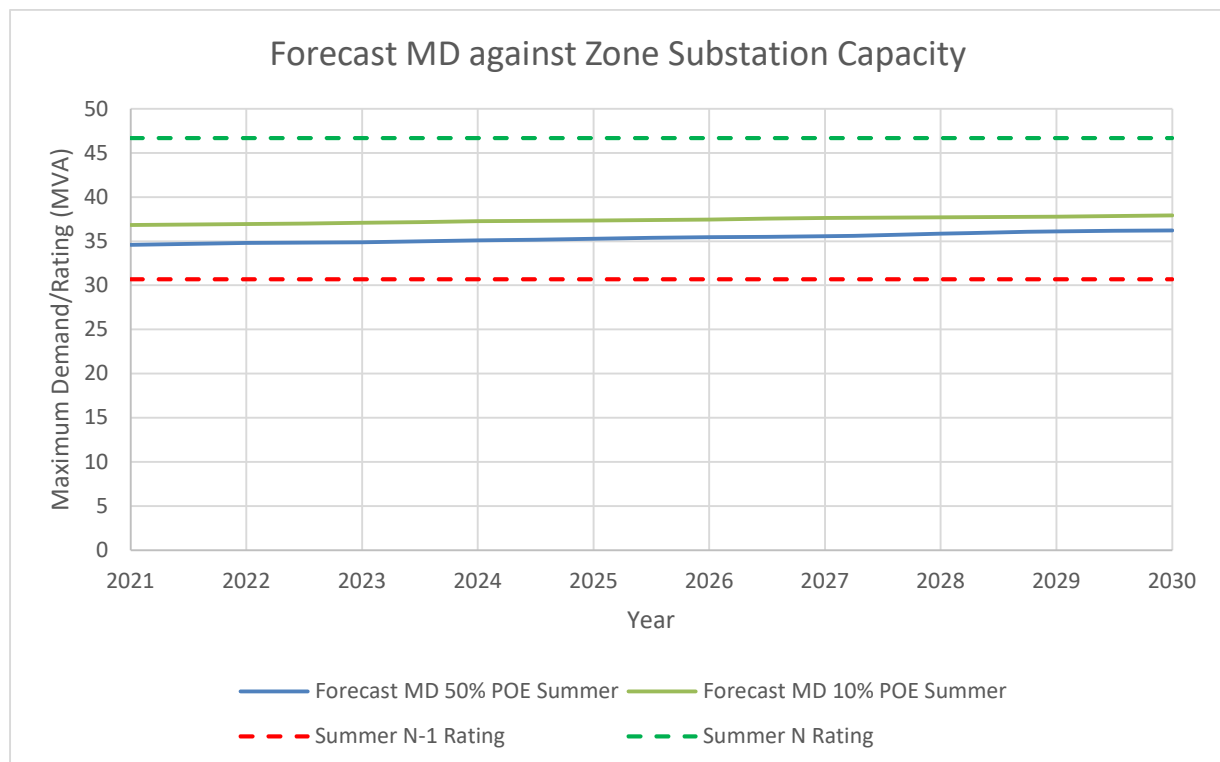


Figure 3: BN Forecast Maximum Demand against Zone Substation Capacity

### 5.4 Load Duration Curves

The zone substation load duration curves that feed into the risk-cost assessment model are derived from historical actual demands between:

- 1 October 2019 and 31 March 2020 for the summer 50% probability of exceedance (POE) curves;
- 1 April 2020 and 30 September 2020 for the winter 50% POE curves;
- 1 October 2019 and 31 March 2020 for the summer 10% POE curves; and
- 1 April 2020 and 30 September 2020 for the winter 10% POE curves.

The historical hourly demands are separated by season and unitised based on the recorded maximum demand within that season (summer and winter) and time period, which allows the load duration curve to be scaled according to the seasonal forecast maximum demand for each year of the assessment period.

The 50% POE unitised load duration for BN zone substation is presented in Figure 4, and the 10% POE unitised load duration for BN zone substation is presented in Figure 5.

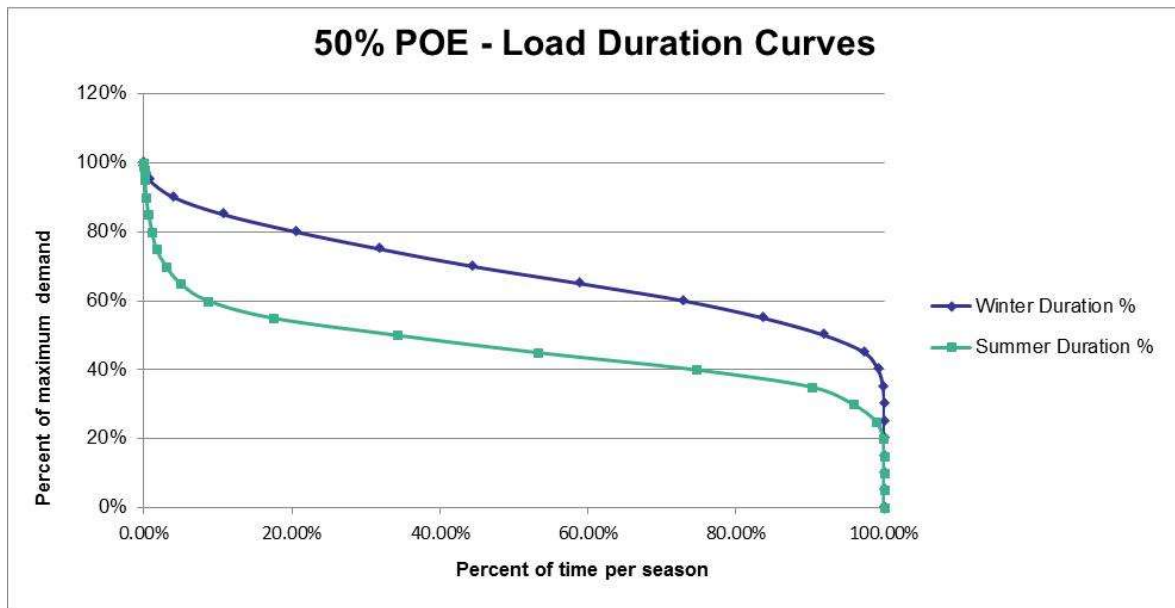


Figure 4: BN 50% Load Duration Curves

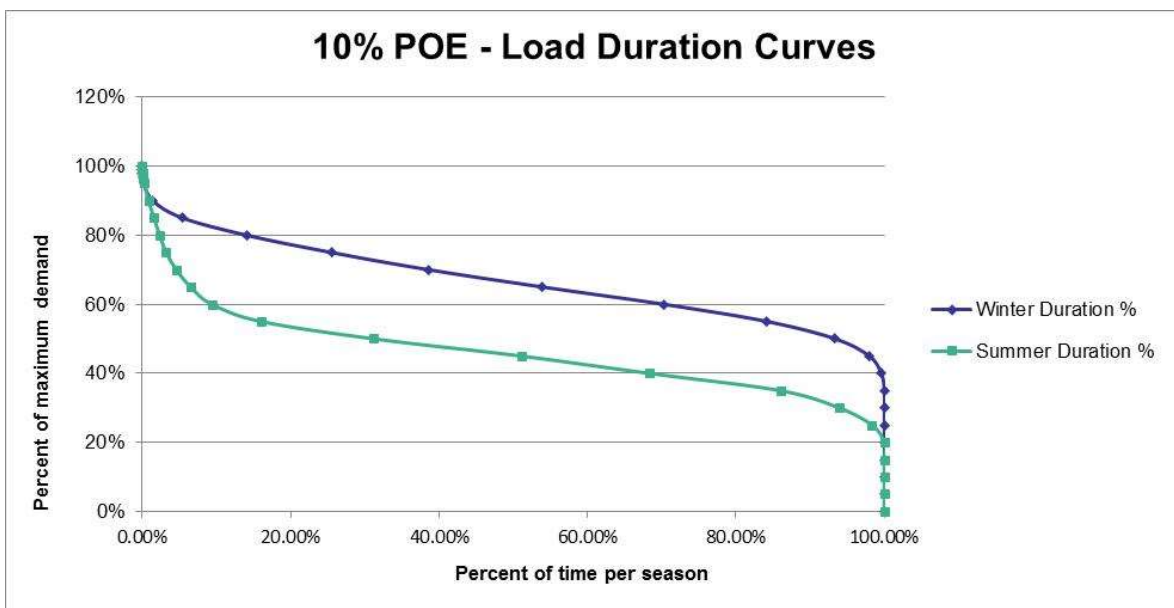


Figure 5: BN 10% POE Load Duration Curves

### 5.5 Feeder Circuit Supply Capacity

There is currently no requirement for additional feeders at BN due to the modest load growth expected in the supply area.

### 5.6 Load Transfer Capability

The Distribution Annual Planning Report (DAPR) provides the load transfer capability (in MW) of the feeder interconnections between BN and its neighbouring zone substations. Our forecast load transfer capability is set out in Table 4.



---

**Service constraints at BN – Non-network options report**


---

**Table 4: BN Load Transfer Capability**

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Load Transfer Capability (MW)	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6

### 5.7 Station Configuration Supply Risk

Failure of some 22kV equipment will result in supply outages to customers as backup circuit breakers operate to isolate the failed equipment. These customer outages would be for an estimated duration of two hours, which is the typical time it takes operators to travel to site and manually re-configure circuits to isolate the failed equipment and sequentially restore supply to as many customers as possible.

Table 5 lists the estimated 22kV bus outage consequence factors for each major type of equipment based on the zone substation layout.

**Table 5: BN Bus Outage Consequence Factors**

Equipment	Estimated 22kV Bus Outage Consequence
22kV circuit breaker	55%
22kV current transformer	55%
22kV voltage transformer	50%

## **6 Potential Credible Options**

This section outlines the potential credible options that have been considered to address the identified invest, and summarises the key works and costs associated with implementing these options. It presents both the credible and non-credible options considered. The draft project assessment report, which is the next stage of the RIT-D process, will consider the credibility of each option in further detail. At this stage, it should be noted that an option may not be credible if it fails to address the health and safety issues associated with the risk of asset failure.

The following potential credible options have been identified at BN:

1. Do nothing
2. Retire one transformer
3. Retire one transformer and reduce residual risk through network support
4. Network support to defer retirement and replacement
5. Replace 66kV circuit breakers and poor condition 22kV circuit breakers
6. Replace 66kV circuit breakers and all 22kV circuit breakers
7. Replace 66kV and 22kV circuit breakers and form a ring bus

Each of the network options to address the identified need would need to be delivered during the 2021-25 EDPR period.

The purpose of this non-network options report is to provide an opportunity for non-network proponents to propose solutions. The options described in this section, therefore, should not be regarded as limiting the scope of potential non-network options.

### **6.1 Option 1: Do Nothing**

The Do Nothing (counterfactual) option assumes that AusNet Services would not undertake any investment, outside of the normal operational and maintenance processes. Under this option, increasing supply risk would be managed by increased levels of involuntary load reduction. Increased non-supply risks, such as those associated with safety, collateral damage, reactive replacement and environmental impacts, would be accepted as unmanaged rising risk costs.

The Do Nothing (counterfactual) option establishes the base level of risk, and provides a basis for comparing potential options.

### **6.2 Option 2: Retire one transformer**

This option tests whether the current installed capacity of the substation is still required to meet customer demand and whether equipment could be retired rather than replaced. Based on existing load forecasts, we would expect the retirement of one transformer to result in unserved energy, and therefore this option may not be credible.

The estimated capital cost for this option is \$100k, for associated decommissioning works.

### **6.3 Option 3: Retire one transformer and reduce residual risk through network support**

This option supplements Option 2 by examining whether the addition of network support would provide a cost effective means of eliminating residual risk and therefore produce a higher net market benefit. The cost of obtaining network support will be the principal direct cost associated with this option, with capital expenditure of approximately \$130k for the associated decommissioning works and setting up a network support agreement.

---

## Service constraints at BN – Non-network options report

---

The purpose of this non-network options report is to test with non-network proponents whether this option is feasible and to better understand the likely costs of procuring network support. The details of the technical requirements for network support and the maximum available funding is discussed in the next section.

### **6.4 Option 4: Network support to defer replacement**

This option extends Option 3 to consider whether sufficient network support could be provided to avoid entirely the proposed retirement and replacement of the network assets, i.e. a network support only solution.

As noted in relation to Option 3, this option will involve relatively modest direct costs to decommission assets and set up a network support agreement. The principal costs of this option, which is to be explored with non-network proponents, is the cost of procuring network support. Further information to assist non-network proponents is provided in the next section.

### **6.5 Option 5: Replace 66kV circuit breakers and poor condition 22kV circuit breakers**

This option replaces the six condition five 66kV circuit breakers, and five condition five 22 kV circuit breakers in situ.

This option has an estimated capital cost of \$7.29 million.

### **6.6 Option 6: Replace 66kV circuit breakers and all 22kV circuit breakers**

This option replaces the six condition five 66kV circuit breakers in situ and replaces the existing 22kV switchgear with two new indoor 22kV switchboards.

This option has an estimated capital cost of \$8.97 million.

### **6.7 Option 7: Replace 66kV and 22KV circuit breakers and form a ring bus**

This option replaces the six condition five 66 kV circuit breakers, and rearranges the 66 kV switchyard to form a 66kV ring bus, and replaces the existing 22 kV switchgear with two new indoor 22kV switchboards.

This option has an estimated capital cost of \$16.53 million.

## **7 Requirements for non-network option**

This section outlines:

- The technical characteristics that a non-network (network support generation, energy storage and/or demand management) option would be required to deliver; and
- The information that a non-network proponent should provide to AusNet Services to explore the potential provision of a non-network service.

The amount that AusNet Services would be willing to pay for a non-network service depends on the extent to which it will mitigate the risks described in the identified need. Key factors that influence the network support amount payable to proponents include availability, capacity, dispatch duration and firmness of response provided by the non-network solution.

### **7.1 Load reduction and location**

As detailed in section 4, the identified need comprises a number of different elements, which can be grouped together in the following broad categories:

- Security of supply risk;
- Health and safety risks;
- Plant collateral damage risks;
- Environmental risks; and
- Reactive asset replacement risks.

In broad terms, these risks are asset-related and will only be mitigated by a non-network option if it is able to reduce the existing dependency on the relevant assets. For asbestos related risks associated with BN, for example, it is highly unlikely that these risks can be mitigated by a non-network option (as the risk relates to the fabric of the building).

However, if the need for one or more transformers or other assets can be eliminated through a non-network option, then savings may result by reducing the risks associated with asset failure. The ability for a non-network solution to support an N-1 contingency on a summer peak demand day is one such scenario.

The table below sets out the load reductions that a non-network option would be required to deliver on a maximum demand day, in order to mitigate the identified risks at BN to some extent, e.g. loss of one transformer.

**Table 6: Load at risk and non-network support requirements**

Year	Load at Risk (MVA)	Hours at Risk, POE50	Expected non-network support required during MD event	
			MW @ PF = 1	MWh
2021/22	3	10	3	7
2022/23	3	11	3	7
2023/24	3	12	3	8
2024/25	3	13	3	9
2025/26	3	14	3	10
2026/27	3	14	3	11
2027/28	4	16	4	12
2028/29	4	18	4	14
2029/30	4	19	4	14

If non-network options are able to reduce the load by more than this minimum amount under an N-1 scenario, then the level of risk mitigation is likely to be higher.

## 7.2 Power system security, reliability and fault levels

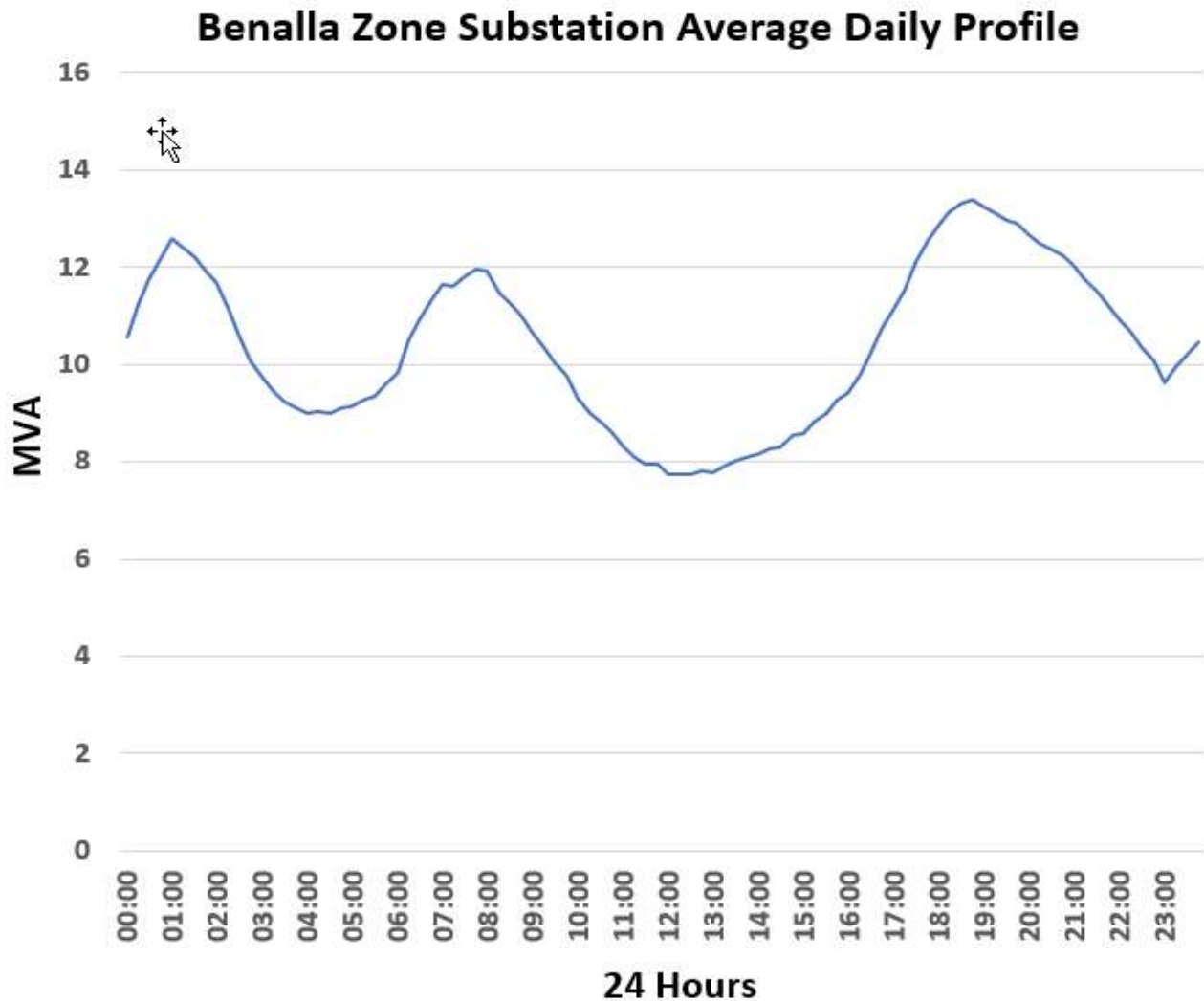
A non-network option must be capable of reliably meeting electricity demand under a range of conditions and scenarios. The non-network solution will contribute to system security and reliability to the extent that it addresses the risks arising from the identified need. The non-network option is not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

If the non-network option is a rotating or inverter-based generator operating in parallel with AusNet Services' 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.

## 7.3 Timing and operating profile

A non-network option would need to be agreed by 30 November 2021 in order to defer the adoption of a network solution. AusNet Services' expectation is that a non-network solution would be required for a minimum of five (5) years, although the duration of the service would be subject to negotiation.

A non-network option must, as a minimum, be capable of reducing network loading or increasing network capacity in the BN supply area during the months of December to March (summer period). For each day during this period, the network load reduction or increase in network capacity would be required over the evening period, typically 5 pm to 8 pm (AEST), as shown in Figure 6.



**Figure 6: Average 24-hour Demand Profile, Showing Timing of Peak Demand**

The maximum duration of non-network support required over a day can be up to four consecutive hours per day. The non-network solution will need to be capable of operating continuously during these periods on consecutive days, to cater to peak demands until the faulted asset is repaired or replaced, and full N-rated capacity is restored at the zone substation.

#### **7.4 Guidance on potentially feasible options**

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

- New embedded generation;
- Existing customer generation and load curtailment (firm demand management); and
- Embedded energy storage systems.

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

---

**Service constraints at BN – Non-network options report**

---

- Unproven, experimental or undemonstrated technologies.

**7.5 Data requirements from non-network service providers**

Non-network service providers interested in alleviating the network constraints outlined above are advised to begin engagement with AusNet Services 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.
- 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).

---

## Service constraints at BN – Non-network options report

---

- 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 Services' 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>

### 7.6 Potential payments to non-network proponents

As already noted, the maximum amount that AusNet Services would be willing to pay for a non-network solution would depend on the value that it provides in terms of risk reduction. The actual payment to a non-network proponent will be subject to negotiation.

Provisional analysis indicates that Option 6 is the preferred network option. If this option could be deferred *entirely* by engaging a non-network solution, the total capital expenditure of approximately \$8.97 million could be deferred. The approximate maximum annual payment that would be available to a non-network proponent to defer this expenditure would be in the region of \$485 k per annum. This calculation assumes a 45 year asset life, an operating expenditure allowance of 1% of the avoided network capital expenditure, and a cost of capital of 5.9% (real).

It should be emphasised, however, that the actual payment for a non-network solution may be lower than this maximum available amount, due to the aforementioned factors of availability, capacity, dispatch duration and firmness of response provided by the non-network solution.



## **8 Next Steps**

The assessment outlined in this report shows that the service level risk to customers supplied from BN is forecast to grow to unacceptable levels within the 2021-25 EDPR period.

The forecast increase in service level risk is driven by increasing supply and non-supply (safety, environmental, collateral damage and reactive replacement) risk due to deterioration in the condition of the assets resulting in an increasing likelihood of asset failure. AusNet Services considers that one of the potential credible options outlined in this report, or an alternative non-network option will be required to address the identified need.

### **8.1 Request for submissions**

AusNet Services invites written submissions, on the matters set out in this non-network options report, 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:

Fuji Dinh  
Senior Engineer – Strategic Network Planning  
AusNet Services  
Email: [ritdconsultations@ausnetservices.com.au](mailto:ritdconsultations@ausnetservices.com.au)

Submissions are due on or before 21 July 2021.

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

### **8.2 Next stage of RIT-D process**

Following conclusion of the non-network options report consultation period, AusNet Services will, having regard to any submissions received on this non-network options report, prepare and publish a draft project assessment report (DPAR) including:

- A summary of, and commentary on, any submissions on the non-network options report.
- 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 Services expects to publish the DPAR by Q3 2021.