

EVOENERGY NON- NETWORK OPTIONS REPORT GOLD CREEK CAPACITY-RIT-D

NON-NETWORK OPTIONS REPORT GOLD CREEK
ZONE SUBSTATION CAPACITY UNDER THE
REGULATORY INVESTMENT TEST-DISTRIBUTION (RIT-
D)

Consultation period commences: 30/08/2022

Consultation period closes: 28/11/2022

CONTENTS

DEFINITIONS AND ABBREVIATIONS	5	4.6 Value of Customer Reliability	22
EXECUTIVE SUMMARY	8	4.7 Approach to Estimating Project Costs	23
About Evoenergy	8	5. POTENTIAL CREDIBLE NETWORK OPTIONS	23
Background	8	5.1 Base Case (Do Nothing)	23
Identified need	8	5.2 Network Option 1 (Preferred): Installation of third transformer at Gold Creek Zone Substation	24
Preferred Network Option	9	5.2.1 Technical Definition and Characteristics	24
Non-Network Options	9	5.3 Option 2: Accelerated construction of Mitchell Zone Substation	26
Next Steps	10	5.4 Option 3: Increase transfer capacity from Gold Creek to other zone substations through 11kV network	26
1. INTRODUCTION	11	5.5 NPC Comparison	27
1.1 Scope and Purpose	12	6. POTENTIAL CREDIBLE NON-NETWORK OPTIONS	27
1.2 Obligations	12	6.1 Non-Network Option 1 - Batteries located within the Gungahlin load centre	27
1.3 Structure of Report	12	6.1.1 Technical definition and characteristics	27
2. BACKGROUND	13	6.1.2 Estimated construction timetable and commissioning date	28
2.1 Existing Supply System	13	6.2 Non-Network Option 2 – Single large battery located close to Gold Creek ZSS	28
2.2 Substation Continuous and Emergency Ratings	14	6.2.1 Technical definition and characteristics	28
2.2.1 Continuous rating	14	6.2.2 Estimated construction timetable and commissioning date	28
2.2.2 Emergency rating	14	6.3 Non-Network Option 3 – Demand management	28
2.2.3 Gold Creek Zone Substation Ratings	14	6.3.1 Estimated implementation timetable	28
2.3 Relevant Regulatory and Statutory Obligations	15	7. TECHNICAL INFORMATION FOR NON-NETWORK OPTIONS	28
2.3.1 National electricity Rules	15	7.1 General	28
2.3.2 Electricity Transmission Supply Code	15	7.2 Target Area	28
3. DESCRIPTION OF IDENTIFIED NEED	16	7.3 Investment Timing Requirements	29
4. ASSESSMENT METHODOLOGY AND ASSUMPTIONS	18	7.4 Technology Specific Requirements	29
4.1 Methodology	18	7.4.1 Size and capacity	29
4.2 Economic Assessment Timeframe	18		
4.3 Electrical Demand	18		
4.3.1 Scenarios	19		
4.3.2 Maximum Demand	19		
4.3.3 Load Profile	20		
4.4 Load Transfer Capability and Supply Restoration	22		
4.5 Network Asset Failure Rate and Outage Duration	22		

7.5	Available Funds for Deferral	29
8.	SUBMISSIONS	30
8.1	Invitation for Submissions	30
8.2	Information from Non-Network Providers	31
8.3	Next Steps	32
8.3.1	Timeline	32

8.3.2	Documents	32
VERSION CONTROL		32
DOCUMENT CONTROL		33

Disclaimer

Whilst this document contains material relevant to the electricity industry legislation, codes of practice and standards, it is not intended to provide legal advice on how electrical contractors can meet their own statutory obligations or comply with legislation, codes of practice or industry. Whilst care has been taken in the preparation of this document, Evoenergy does not guarantee that the information contained in this document is accurate, complete, or up to date at time of publication. To the extent permitted by the relevant legislation Evoenergy will not be responsible for any loss, damage, cost, or expense incurred as a result of any error, omission or misrepresentation in relation to the information contained in this document.

Note

Printed versions of this document are “uncontrolled copies” - the latest version is available on the [Evoenergy website](#).

DEFINITIONS AND ABBREVIATIONS

Definitions

TABLE 1: DEFINITIONS

ACT government – Electrical Inspectorate	The ACT Government Electrical Inspectorate is the inspecting authority in the ACT and is responsible for inspecting and approving the consumer's electrical installation
Continuous rating	Substation N-1 rating capable of continuous reliable operation (24/7)
Demand response	A change from normal mode of load operation induced by a signal triggered by a network constraint or other constraint, to reduce demand for energy or market ancillary services within a region
Embedded generating system	A system comprising of multiple embedded generating units (e.g. solar PV system with a battery storage system)
Embedded generating unit	A generating unit connected within a distribution network and not having direct access to the transmission network
Emergency rating	Substation N-1 rating above nameplate ratings capable of reliable operation for short duration. Operating assets at this rating accelerates loss of asset life thus exposure to these conditions is limited
Evoenergy	Evoenergy is the ACT's principal Distribution Network Service Provider (DNSP) and is responsible for the distribution of electricity to all customers within the ACT
Firm delivery capacity	Maximum allowable output or load of a network or facility under single contingency conditions, including any short-term overload capacity having regard to external factors that may affect the capacity of the network or facility ¹
Frequency control and ancillary services	Services used by the energy market operator to maintain the frequency of the system within the normal operating band, which functions to provide a fast injection or reduction of energy to manage supply and demand, respectively
High Voltage (HV)	Any voltage greater than 1 kV AC
Load centre	Regions on the electricity distribution network close to load/centres of demand
Low Voltage (LV)	The mains voltages as most commonly used in any given network by domestic and light industrial and commercial consumers (typically 230 V)
Network	Evoenergy's distribution network
Non-network provider	A person who provides non-network options; proposing to become a generator (the relevant owner, operator or controller of the generating unit (or their agent)
RIT-D proponent	The Network Service Provider applying the regulatory investment test for distribution to a RIT-D project to address an identified need ²
Thermal constraint	A thermal limitation on the capability of a network, load or generating unit such that it is unacceptable to either transfer, consume or generate the level of electrical power that would occur if the limitation was removed

¹ As per definition from National Electricity Rules for *firm delivery capacity*

² As per definition from National Electricity Rules for *RIT-D proponent*

Utilities Technical Regulation Team	The ACT Government team responsible for the technical administration of utility requirements and administration of the Utilities (Technical Regulation) Act 2014
Value of Unserved Energy	A quantified measure of the resource availability to continuously serve all loads at all delivery points while satisfying all planning criteria, results involve analysing all hours of a particular year and calculations are presented as units of energy or currency
Weighted average cost of capital	Relevant weighted average cost of capital for a network service provider for a regulatory control period, being the return on capital for that network service provider for that regulatory control period calculated in accordance with National Electricity Rules

Abbreviations

TABLE 2: ABBREVIATIONS

AC	Alternating Current
ACT	Australian Capital Territory
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AS	Australian Standard
AS/NZS	A jointly developed Australian and New Zealand Standard
CBD	Central Business District
CEC	Clean Energy Council
CPI	Consumer Price Index
DER	Distributed Energy Resource
DNSP	Distribution Network Service Provider
DSE-RIP	Demand Side Engagement Register of Interested Parties
EV	Electric Vehicle
FCAS	Frequency Control Ancillary Services
FAQ	Frequently Asked Question
FY	Financial Year
HV	High Voltage
LV	Low Voltage
MW	Megawatt
NEM	National Electricity Market
NER	National Electricity Rules
NNOR	Non-network options report
NPC	Net Present Cost
ODAF	Oil Directed, Air Forced
ODAN	Oil Directed, Air Natural
ONAN	Oil Natural, Air Natural

PoE	Probability of Exceedance
PV	Photovoltaics
RIT-D	Regulatory Investment Test for Distribution
STPIS	Service Target Performance Incentive Scheme
USE	Unserved Energy
UTR	Utilities Technical Regulator
V	Volt
VA	Volt-Ampere
VAr	Volt-ampere-reactive
VCR	Value of Customer Reliability
W	Watt
WACC	Weighted Average Cost of Capital
ZSS	Zone Substation

EXECUTIVE SUMMARY

About Evoenergy

Evoenergy owns and operates electricity and gas networks and is licensed by the Independent Competition and Regulatory Commission (ICRC) to provide transmission, distribution, and connection services in the ACT. Evoenergy is both a Distribution Network Service Provider and a Transmission Network Service Provider registered with the Australian Energy Market Operator (AEMO). We are a regulated service provider subject to commonwealth and jurisdictional laws and statutory instruments including National Electricity Law (NEL), National Electricity Rules (NER), Utilities Act 2000, Utilities Technical Regulations Act, industry codes, technical codes, and regulations. Our “poles and wires” network is supplied predominantly by power imported from interstate. Evoenergy’s primary focus is on the provision of a safe, reliable, and quality electricity supply in a cautious and efficient manner. We are asset management certified for compliance with ISO 50001 Asset Management Standard. Safety and risk management are key considerations of our business decisions. Whenever practicable, risk management is integrated with investment decisions and considers the life cycle of assets and least cost solutions.

Background

This Non-Network Options Report (NNOR) has been prepared to inform non-network providers that may be able to provide services to defer or avoid a network augmentation project. The National Electricity Rules (NER) require a Regulatory Investment Test – Distribution (RIT-D) be completed for augmentation capex projects with a value greater than \$6m. The RIT-D requires a NNOR where an initial assessment has identified potentially credible non-network options that may defer or avoid the augmentation project being considered by the RIT-D.

Gungahlin is the northernmost district of Canberra and is divided into sixteen suburbs constructed between 1991 and 2022. The district is predominately residential, supporting a population of >71,000 people based on the 2016 census. The town centre is located in the suburb of Gungahlin and contains a mix of medium and high-density residential dwellings, retail and office space. The town centre is also the origin point of the Canberra light rail system. The district includes the light industrial suburb of Mitchell.

Electricity is distributed to Gungahlin from the Gold Creek Zone Substation (GOLD CREEK ZSS) located in Ngunnawal. The substation was commissioned in 1994 with two 57 MVA power transformers. There were 26,150 dwellings in the district in 2016 and this has steadily risen in recent years to over 31,000 due to greenfield land releases and high-density residential developments.

Load in the Gungahlin district is forecast to continue to grow primarily due to additional greenfield residential development, mixed-use urban infill, expansion of light commercial/industrial facilities and electrification including gas transition and decarbonisation of the transport sector.

Evoenergy have identified the need to increase the redundant capacity of the electrical supply for the Gungahlin district in their Annual Planning Report (APR) in each edition from 2019 to 2021. The preferred network option for the proposed increase in capacity is in excess of the \$6m threshold under the NER and therefore subject to a RIT-D.

Identified need

The Gungahlin district is experiencing significant urban growth due to the development of new suburbs such as Jacka and Kenny as well as medium and high-density residential development in the town centre and light commercial development in Mitchell³. These developments and subsequent load growth are expected to continue over the next ten years. In addition to this there is expected to be a further increase in load due to the ACT Government’s targets to move to net zero emissions by 2045 which includes decarbonisation of the gas network and transport sectors. Load forecast for the PoE 50 base case can be seen in Table 3.

³ ACT indicative land release program 2022-23 to 2026-27 available here: https://www.planning.act.gov.au/_data/assets/pdf_file/0006/2050179/Indicative-Land-Release-Program-2022-23-to-2026-27.pdf

TABLE 3: GOLD CREEK ZONE SUBSTATION LOAD FORECAST

Season	Case	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Summer	MD 50% PoE	76	79	82	85	89	92	95	98	101	104
Winter	MD 50% PoE	83	87	90	93	96	100	103	106	109	113

Note: Red denotes exceedance of 2-hour emergency summer and winter limits for a single transformer (all values in MVA)

Based on the requirements in the ACT Electricity Transmission Supply Code 2016, there is currently insufficient redundant capacity at Gold Creek Zone Substation for short but increasing periods of time and minimal coincident opportunity to transfer load to neighbouring zone substations.

Preferred Network Option

The preferred network option is to install and commission an additional (third) 57 MVA transformer at Gold Creek zone substation.

The scope of work includes connection to the existing 132kV bus, 132kV circuit breaker, 132kV CTs and surge diverters, 11kV transformer cables, 11kV switchboard and associated protection, monitoring and communications equipment. Should this be selected as the preferred solution, these works are expected to be completed and commissioned prior to winter peak 2025. Should there be a transformer failure prior to commissioning the third transformer, Evoenergy would utilise load transfer capacity to minimise the impacts of unserved energy during this time. This is the preferred option for the following reasons:

- Lowest NPC of acceptable network options
- Effectively doubles Gold Creek ZSS continuous and 2-hour emergency ratings
- Increases the capacity and flexibility of Gold Creek ZSS to manage the ACT government Net Zero by 2045 target and the associated load growth from full electrification and EV charging
- Lowest level of complication and community disruption from land access and construction/civil works
- Does not adversely impact redundancy at nearby zone substations

Non-Network Options

Evoenergy’s initial assessment of non-network solutions for the Gungahlin District has found three potentially credible non-network options. Two are based on the use of batteries to temporarily defer investment in a network augmentation. Option 1 involves two or more batteries located within the Gungahlin District near the load centres. This could include residential batteries aggregated by a Virtual Power Plant (VPP) scheme and controllable loads or larger centralised batteries. Option 2 involves a single large battery connected to Gold Creek ZSS. Non-network proponents would be responsible for all connection costs.

The potential credible options assume that a battery or batteries will be installed with a primary purpose that is not to support Evoenergy’s network. That is, the value available to defer the network option, is unlikely to be sufficient to entirely fund the required battery and additional investment drivers are likely to be required. Examples of additional investment drivers include as part of a larger energy investment project, due to a government program obligation, for wholesale electricity price arbitrage, participation in the Frequency Control Ancillary Services (FCAS) market or as part of a back-up system for an electricity user. The majority of the battery’s value will likely come from these additional purposes, with network support payments from Evoenergy providing an additional revenue stream.

The third potentially credible non-network solution would be the implementation of demand management.

Evoenergy is technology/solution agnostic and seeks submissions on all feasible solutions to defer investment at this site. This may include partial solutions including demand response, embedded generation and smaller batteries for Evoenergy to evaluate whether it can combine solutions to address the identified need.

Available funds for deferral are determined by the financial benefits to Evoenergy of deferring capital expenditure. For the identified need in the Gungahlin district, the deferral benefit is made up of two components, avoided financing costs and avoided depreciation of capital assets.

The maximum payment to a non-network service provider will depend on the expected unserved energy the service will result in. As Evoenergy uses probabilistic planning and does not have deterministic planning compliance obligations, there is no requirement for a service provider, or Evoenergy, to reduce expected unserved energy to zero. Funds available for deferral are listed in Table 4.

TABLE 4: DEFERRAL VALUE (FY22/23 PAYMENT)

DEFERRAL PERIOD	DEFERRAL DATES	DEFERRAL VALUE (\$)
1-year deferral	April 1 2025 to April 1 2026	211,980
2-year deferral	April 1 2025 to April 1 2027	416,465
3-year deferral	April 1 2025 to April 1 2028	613,691

If there are no additional costs to Evoenergy (including unserved energy costs and risk margins) a non-network solution provider can receive total payments, in present value terms, up to the amounts presented in the table. This could be as a once off payment, but is more likely to be structured as an availability payment plus a variable component linked to the actual usage of the non-network solution by Evoenergy. Evoenergy will consider and negotiate pricing structures included in a submission.

Next Steps

Evoenergy is seeking proposals from any non-network provider that is able to provide services which meet or partially meet the identified network need. Submissions will be required to provide detail about the type, scale and cost of non-network solutions offered by providers.

Submissions can be lodged via email to: RIT@evoenergy.com.au

Submissions must be received by 5pm 28 November 2022. In addition, non-network providers must submit a Special Connection Request form via Evoenergy's website, and attach, where prompted, the relevant documentation.

Evoenergy will review each non-network option proposal and may seek further information from the non-network provider to better understand the design of the proposed solution and its impacts on the network and other network users.

An overview of the timeline, from the publication of this NNOR to when the preferred option is required to be operational, is provided in Table 5 below.

TABLE 5: TIMELINE

ACTIVITIES	DATES
Publish NNOR and request for submissions ⁴	30 August 2022
Consultation period ⁵ for non-network providers to provide submissions	30 August 2022 - 28 November 2022
Public briefing session during consultation period – Details to be confirmed	September 2022
Evoenergy review of submissions received (non-network proposals)	November 2022
Publish final project assessment report ⁶	January 2023
Preferred option operational	April 2025

⁴ Evoenergy will notify registered parties on Demand Side Engagement Register of Interested Parties (DSE-RIP) form as per NER clause 5.17.4(g), available from <https://www.evoenergy.com.au/emerging-technology/demand-management>

⁵ Not less than 3 months in duration from notifying registered parties on DSE-RIP as per NER clause 5.17.4(h)

⁶ As soon as practicable after the end of the consultation period as per NER clause 5.17.4(p)

1. INTRODUCTION

Gungahlin is the northernmost district of Canberra and is divided into sixteen suburbs constructed between 1991 and 2022. The district is predominately residential, supporting a population of >71,000 people based on the 2016 census. The town centre is located in the suburb of Gungahlin and contains a mix of medium and high-density residential dwellings, retail and office space. The town centre is also the origin point of the Canberra light rail system. The district includes the light industrial suburb of Mitchell. The Gungahlin district can be seen in Figure 1.

Electricity is distributed to the Gungahlin from the Gold Creek Zone Substation located in Ngunnawal. The substation was commissioned in 1994 with two 57 MVA power transformers. There were 26,150 dwellings in the district in 2016 and this has steadily risen in recent years to over 31,000 due to greenfield land releases and high-density residential developments.

Evoenergy have identified the need to increase the capacity of the electrical supply for the Gungahlin district in their Annual Planning Report (APR) in each edition from 2019 to 2021. The preferred network option for the proposed increase in capacity is in excess of the \$6m threshold under the NER and therefore subject to a RIT-D.

Evoenergy invites non-network proponents to submit credible options that may defer or avoid the credible network solution to the identified need.

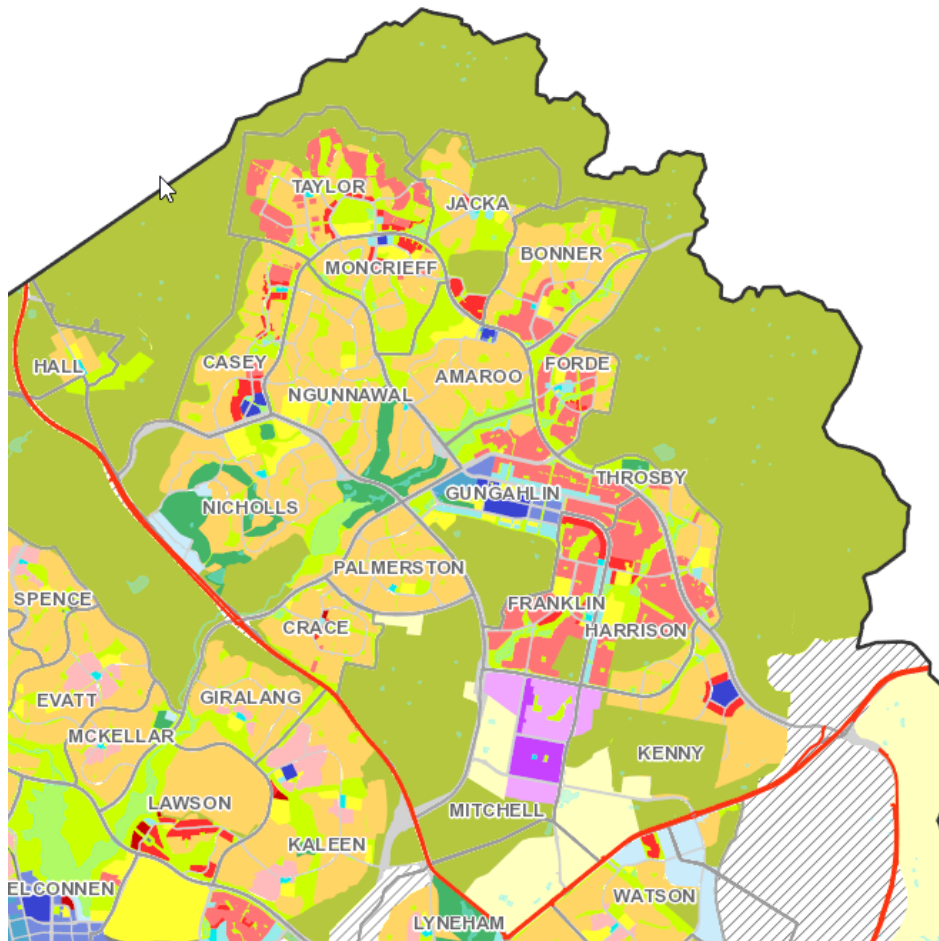


FIGURE 1: DISTRICT OF GUNGAHLIN CONSISTS ALL SUBURBS ABOVE THE RED BORDER⁷

⁷ Source: <https://www.actmapi.act.gov.au/>

1.1 Scope and Purpose

Under the RIT-D process, Evoenergy is required to consider all credible network and non-network options to meet future electricity demand. The RIT-D process⁸⁹ involves the following key stages:

- Stage 1: Screening for non-network options and publishing a NNOR,
- Stage 2: Undertaking consultation on non-network options,
- Stage 3: Assessment of credible options,
- Stage 4: Publishing a final project assessment report.

As a part of Stage 1, Evoenergy has developed this NNOR in accordance with the requirements of Chapter 5 clause 5.17.4 of the NER. This report outlines the need for the proposed investment, and the range of feasible network and non-network options available to resolve the identified need. The information contained within this report should enable third parties to provide informed submissions to supply non-network solutions to Evoenergy to defer and/or avoid the requirement for a significant network augmentation.

Details regarding the process for non-network providers to make submissions for non-network solutions are provided in Section 8.

1.2 Obligations

Evoenergy has obligations relating to this NNOR, including:

- To ensure that the NNOR is published in a timely manner having regard to the ability of parties to identify the scope for, and develop, alternative potential credible options or variants to the potential credible options.¹⁰
- To notify persons registered on its demand side engagement register of the report's publication.¹¹
- To provide Registered Participants, Australian Energy Market Operator (AEMO), interested parties, non-network providers and (if relevant) persons registered on Evoenergy's demand side engagement register with not less than three months in which to make submissions on the NNOR from the date that this report is published.¹²
- To pay particular attention when considering the risk, value of optionality and expenditure timing of non-network options. In particular, modelling, forecasts and assumptions should be consistent, open and transparent to help effectively explore non-network options.¹³
- To satisfy capital expenditure objectives and identify capital expenditure and operating expenditure trade-offs.¹⁴

1.3 Structure of Report

- Section 2 provides background information on the network location and the associated infrastructure.
- Section 3 describes the identified need that is to be addressed.
- Section 4 reviews the planning methodology and assumptions used in the assessment of the credible options.
- Section 5 details the credible network options, provides an indicative assessment of their respective augmentation costs and the estimated commissioning dates.
- Section 6 details the credible non-network options.
- Section 7 presents the technical characteristics of the identified need, intended to guide non-network providers in developing credible non-network options.
- Section 8 provides guidance on the assessment process to third parties interested in submitting a response and the next steps.

⁸ NER version 186 clause 5.17.4, available here <https://energy-rules.aemc.gov.au/ner/408/148582#5.17.4>

⁹ AER, Regulatory investment test for distribution application guidelines, December 2018, available from <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-2018>

¹⁰ As per NER clause 5.17.4 (f)

¹¹ As per NER clause 5.17.4 (g)

¹² As per NER clause 5.17.4 (h)

¹³ AER Regulatory investment test for distribution application guidelines Section 4.2, December 2018, available from <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-2018>

¹⁴ NER clause 6.5.7 (a)

2. BACKGROUND

2.1 Existing Supply System

The Gungahlin District is supplied by the 132/11kV Gold Creek Zone Substation located in Ngunnawal. The substation has a continuous rating of 114 MVA and consists of two 57 MVA power transformers supplying 31,600 customers through 22 primarily underground 11kV feeders. The load supplied is primarily domestic, however includes the Gungahlin town Centre, light rail and the light industrial suburb of Mitchell. The Gungahlin district has significant solar PV penetration with 6,913 registered sites with combined capacity output up to 38,601 kW, mainly due to generous government incentive schemes. This has led to some over-voltage issues during peak generation times.

Gold Creek zone substation was commissioned in 1994 and was constructed with provisions for the installation of a third transformer as the load in the Gungahlin district grew. GOLD CREEK ZSS location and the northern Canberra 132 kV transmission network can be seen in Figure 2.

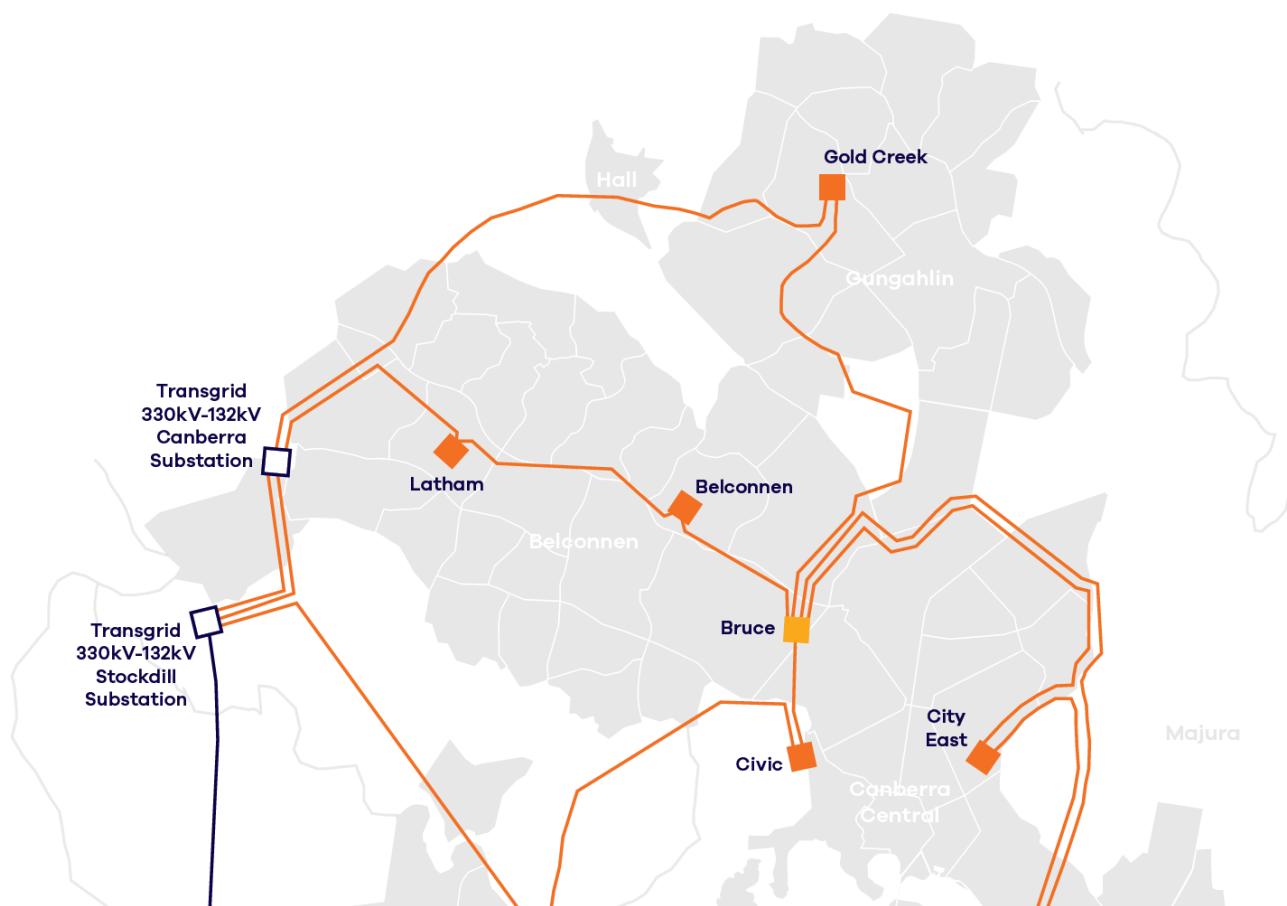
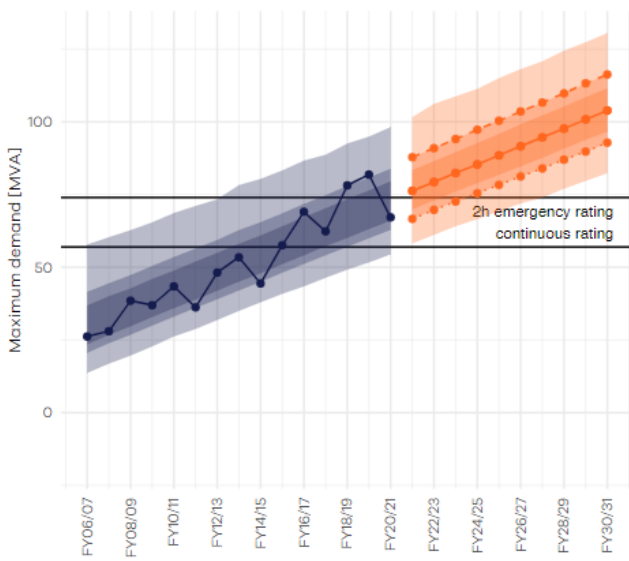


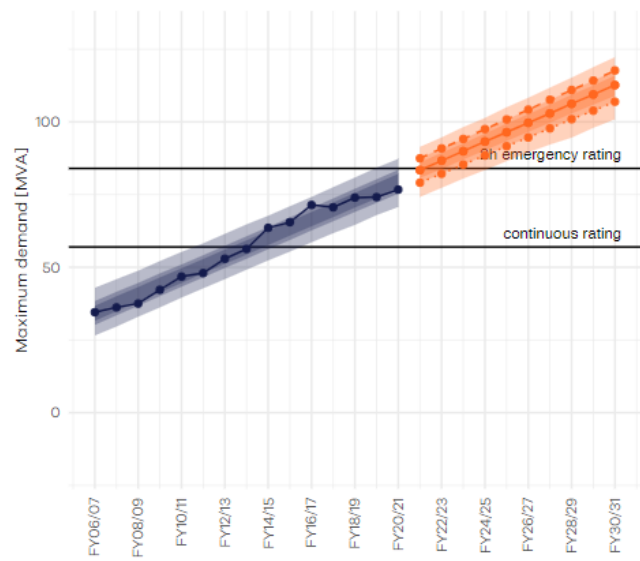
FIGURE 2: EVOENERGY 132 kV TRANSMISSION NETWORK NORTHERN SEGMENT

The development of new suburbs, infrastructure and associated growth in population has seen significant load growth in the Gungahlin District. This load growth has led to instances of GOLD CREEK ZSS exceeding the two-hour emergency rating. The projected load growth is forecast to exceed this rating with increasing occurrence and duration above ratings. The historical and 10-year maximum demand forecast can be seen in Figure 3, where the PoE 50 forecast shows exceedance of the two-hour emergency rating from summer 2022.

Summer



Winter



Forecast - - MD 10% POE — MD 50% POE ···· MD 90% POE

FIGURE 3: GOLD CREEK ZSS HISTORICAL AND 10-YEAR MAXIMUM DEMAND FORECASTS. BANDS DENOTE BAYESIAN [20, 80]%, [10, 90]%, [1, 99]% (FROM INNER TO OUTER) POE FORECASTS

2.2 Substation Continuous and Emergency Ratings

The primary objective of planning is to ensure that customers are able to receive reliable, safe and quality supply of electricity now and into the future. Evoenergy’s planning standards are set to ensure that peak demand can be met with an appropriate level of backup should a credible contingency event occur. A credible contingency event is the loss of a single network element that occurs sufficiently frequently, and has such consequences, as to justify the DNSP to take prudent precautions to mitigate. This is commonly referred to as an N-1 event.

2.2.1 Continuous rating

Substation N-1 rating capable of continuous reliable operation (24/7).

2.2.2 Emergency rating

Substation N-1 rating above nameplate ratings capable of reliable operation for short duration. Operating assets at this rating accelerates loss of asset life thus exposure to these conditions is limited.

2.2.3 Gold Creek Zone Substation Ratings

Table 6 summarises the ratings for the transformers and entire Gold Creek Zone Substation

TABLE 6: GOLD CREEK ZSS AND TRANSFORMER RATINGS (ALL VALUES IN MVA)

	Tx1	Tx3	ZSS
Continuous ONAN	34.5	34.5	N/A
Continuous ODAN	40	40	N/A
Continuous ODAF	57	57	N/A
2-Hour Emergency (Summer)	74	77	74 [^]
2-Hour Emergency (Winter)	84	85	84 [^]

[^]Note: The ZSS 2-Hour Emergency rating is defined as the maximum load the zone substation could thermally operate for a two hour period in the event of a loss of a single power transformer at the ZSS

2.3 Relevant Regulatory and Statutory Obligations

2.3.1 National electricity Rules

The RIT-D process assesses the economic efficiency of the proposed credible option investments. The process is defined by clauses 5.17.1 - 5.17.4 of the NER and the Australian Energy Regulator's (AER) RIT-D guideline¹⁵.

The RIT-D proponent, Evoenergy, is required to apply the RIT-D for all projects where the estimated capital cost of the most expensive potential credible option to address the identified need is greater than \$6 million.

All projects meeting the RIT-D threshold must be screened for potential credible non-network options that address the identified need. Where a non-network option is a potential credible option, or that forms a significant part of a potential credible option, Evoenergy must, as per NER clause 5.17.4, prepare and publish a NNOR.

The NNOR is intended to inform non-network providers of non-network solutions on the costs and market benefits associated with potential credible options and provide an opportunity for them to consider how they could address the identified need.

Clause 5.17.4(e) of the NER requires the NNOR include:

1. A description of the *identified need*.
2. The assumptions used in identifying the *identified need* (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary).
3. If available, the relevant annual deferred *augmentation* charge associated with the *identified need*.
4. The technical characteristics of the *identified need* that a non-network option would be required to deliver, such as:
 - i. The size of *load* reduction or additional *supply*,
 - ii. Location,
 - iii. Contribution to *power system security* or *reliability*,
 - iv. Contribution to *power system* fault levels as determined under clause 4.6.1, and
 - v. The operating profile.
5. A summary of potential credible options to address the *identified need*, as identified by the RIT-D proponent, including *network options* and *non-network options*.
6. For each potential credible option, the RIT-D proponent must provide information, to the extent practicable, on:
 - i. A technical definition or characteristics of the option,
 - ii. The estimated construction timetable and commissioning date (where relevant), and
 - iii. The total indicative cost (including capital and operating costs).
7. Information to assist non-network providers wishing to present alternative potential credible options including details of how to submit a non-*network* proposal for consideration by the RIT-D proponent.

Evoenergy must provide Registered Participants, AEMO, interested parties, non-network providers and persons registered on the demand side engagement register not less than three months in which to make submissions on the NNOR from the date that the NNOR is published

2.3.2 Electricity Transmission Supply Code

The ACT Electricity Transmission Supply Code 2016¹⁶, 4.1.2 states:

ActewAGL must plan, design, construct, test, commission, maintain, operate and manage its electricity transmission networks and connection points that supply customers and that will operate at 132 kV and 66 kV, to achieve the following:

(2) continue to allow electricity supply at maximum demand to each ActewAGL substation (excluding Angle Crossing and Tennent Substations) immediately and automatically after a credible contingency event subject to supply availability from TransGrid.

Note: References to ActewAGL are applicable to Evoenergy.

¹⁵ AER Application Guidelines RIT-D, December 2018, available from <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/rit-t-and-rit-d-application-guidelines-2018>

¹⁶ Available here: <https://www.legislation.act.gov.au/DownloadFile/di/2016-189/current/PDF/2016-189.PDF>

3. DESCRIPTION OF IDENTIFIED NEED

The Gungahlin district is experiencing significant urban growth due to the development of new suburbs such as Jacka and Kenny as well as medium and high-density residential development in the town centre, light rail and light industrial development in Mitchell¹⁷. These developments and subsequent load growth are expected to continue over the next ten years. Load forecast at PoE 10, 50 and 90 can be seen in Table 7.

TABLE 7: GOLD CREEK ZONE SUBSTATION LOAD FORECAST

SEASON	QUANTITY	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Summer	MD 10% PoE	88	91	94	97	100	104	107	110	113	116
Summer	MD 50% PoE	76	79	82	85	89	92	95	98	101	104
Summer	MD 90% PoE	67	70	73	75	78	81	84	87	90	93
Winter	MD 10% PoE	87	91	94	98	101	104	108	111	114	118
Winter	MD 50% PoE	83	87	90	93	96	100	103	106	109	113
Winter	MD 90% PoE	79	82	85	88	92	95	98	101	104	107

Note: Red denotes exceedance of 2-hour emergency limits for a single transformer (all values in MVA)

The ACT is moving to net zero emissions by 2045, which sees the phasing out of natural gas and internal combustion engine vehicles. These changes are expected to significantly increase the load on the electricity network across the ACT. Winter load is expected to increase as a result of the transition away from gas as a domestic heating source, the Gungahlin district has a high reliance on natural gas for heating, hot water and cooking and the phase out of gas is expected to increase the load. Please see Section 4.3 for additional detail on the forecasting scope.

The proliferation of both public and private electric vehicle (EV) charging is expected to significantly increase peak loads. The ACT Government Zero Emissions Vehicles Strategy 2022-30¹⁸ states: *By 2023 at the latest, enact regulation in the Territory Plan to require electric vehicle charging infrastructure for new multi-unit residential and commercial buildings.*

Evoenergy is already seeing the effect of this change as recent applications such as for Block 2 Section 11 Gungahlin with 53,000m² commercial development with 600 residential dwellings, 28,000m² of car parking with 600 EV chargers. The expected load for this development is approximately 9 MVA.

The ACT Electricity Transmission Supply Code 2016¹⁹, 4.1.2 states:

ActewAGL must plan, design, construct, test, commission, maintain, operate and manage its electricity transmission networks and connection points that supply customers and that will operate at 132 kV and 66 kV, to achieve the following:

(2) continue to allow electricity supply at maximum demand to each ActewAGL substation (excluding Angle Crossing and Tennent Substations) immediately and automatically after a credible contingency event subject to supply availability from TransGrid.

Note: References to ActewAGL are applicable to Evoenergy.

There is currently insufficient redundant capacity at Gold Creek Zone Substation for short but increasing periods of time, and minimal coincident opportunity to transfer load to neighbouring zone substations. Figure 4 shows historic exceedance of N-1 emergency rating at GOLD CREEK ZSS and demonstrated both the frequency and duration of exceedance increasing annually. The transformer ratings are listed in Table 6.

¹⁷ ACT indicative land release program 2022-23 to 2026-27 available here:

https://www.planning.act.gov.au/_data/assets/pdf_file/0006/2050179/Indicative-Land-Release-Program-2022-23-to-2026-27.pdf

¹⁸ Available here: https://www.climatechoices.act.gov.au/_data/assets/pdf_file/0006/2038497/2022_ZEV_Strategy.pdf

¹⁹ Available here: <https://www.legislation.act.gov.au/DownloadFile/di/2016-189/current/PDF/2016-189.PDF>

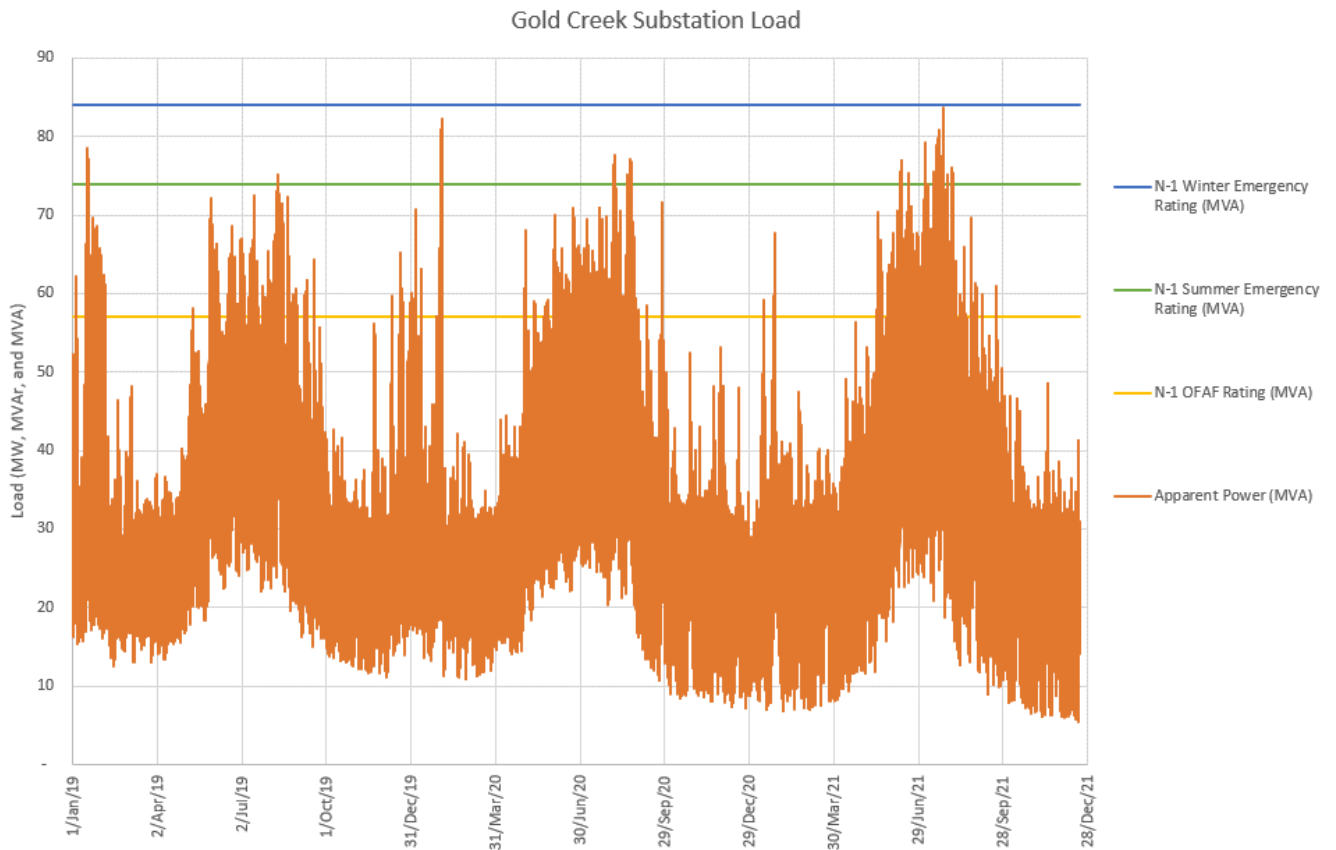


FIGURE 4: HISTORIC EXCEEDANCE OF N-1 RATING AT GOLD CREEK ZONE SUBSTATION

N-1 emergency rating exceedance events at Gold Creek ZSS have historically occurred in summer and in the late afternoon and early evening. June 2022 saw two winter exceedance events during the early evening. Significant (>1 hour) N-1 emergency rating exceedance events are listed in Table 8.

TABLE 8: HISTORIC N-1 EMERGENCY RATING EXCEEDANCE EVENTS AT GOLD CREEK ZSS

DATE AND TIME	DURATION (H:MM)	SEASON (RATING MVA)	MAXIMUM DEMAND (MVA)	ENERGY AT RISK (MWh)
Wed 16 Jan 2019 17:55	1.50	Summer (77)	78.6	4.6
Thu 17 Jan 2019 17:40	1.45	Summer (77)	77.1	3.8
Fri 31 Jan 2020 17:15	3.35	Summer (77)	80.9	15.0
Sat 1 Feb 2020 15:45	3.50	Summer (77)	82.3	23.1
Tue 7 Jun 2022 17:20	2.00	Winter (84)	87.4	10.4
Tue 14 Jun 2022 18:00	1.10	Winter (84)	85.6	2.9

4. ASSESSMENT METHODOLOGY AND ASSUMPTIONS

This section outlines the methodology and assumptions that will be used by Evoenergy to assess all credible network and non-network options that address the identified need. This assessment will take place at the conclusion of the NNOR consultation period, and the outcomes will be published in the draft project assessment report as per the requirements of the RIT-D.

4.1 Methodology

Evoenergy applies a probabilistic planning methodology where the costs and benefits for each credible option are measured against a 'no investment' base case.

Evoenergy has shown that an investment to augment the network in Gungahlin has a higher NPC than a 'no investment' option. The 'do nothing' option breaches Evoenergy's obligations under the ACT Electricity Transmission Supply Code 2016²⁰, section 4.1.2: *continue to allow electricity supply at maximum demand immediately and automatically after a credible contingency event and the potential unserved energy risk*. In addition to this, in a contingency event the 'do nothing' option results in thermal limits of existing network assets being breached and the potential for large amounts of involuntary load-shedding, which drives large unserved energy costs that will be borne by customers (and Evoenergy through the Service Target Performance Incentive Scheme (STPIS) mechanism).

Submissions received for non-network solutions to defer the network option will be assessed probabilistically against the three scenarios detailed in this report. The costs and risks (predominantly the risk of unserved energy) for each solution will be calculated for each scenario and weighted by the probability assigned to the scenario.

4.2 Economic Assessment Timeframe

Evoenergy's initial analysis of the identified need used a 10-year period that covered multiple future stages of investment. The long-term forecast for growth in the Gungahlin district that is driving the need for investment has not changed since the initial analysis was undertaken so a 10-year period will continue to be used, covering the period 2021-2031.

If a proposed non-network option is found to defer the network option, there may be an opportunity for the non-network option to be reused to defer future stages of investment but there is a high degree of uncertainty and Evoenergy cannot commit to incurring upfront costs for future deferral benefits that may not eventuate.

4.3 Electrical Demand

The sections below cover the forecasts used by Evoenergy to assess options that may meet the identified need.

The following items have been excluded from the forecasting scope:

The following recent ACT Government initiatives to meet Net Zero by 2045 including:

- Transition away from natural gas to full electrification of the ACT as a result of future ACT Government initiatives²¹
- Acceleration of take-up of privately owned electric vehicles and associated residential charging infrastructure as a result of the recent ACT Zero Emissions Vehicles Strategy 2022-2030²²

The following reasons are provided for exclusion from the forecasting:

1. Targets are not yet legislated and future incentive programs have not been released,
2. Evoenergy has performed extensive modelling around net-zero pathways and with current legislation and incentive schemes in place we do not believe that there will be a significant change in maximum demand forecasts over the next 3 years – which is the timeframe for this project

²⁰ Available here: <https://www.legislation.act.gov.au/DownloadFile/di/2016-189/current/PDF/2016-189.PDF>

²¹ Media release available here:

https://www.cmtedd.act.gov.au/open_government/inform/act_government_media_releases/barr/2022/powering-canberra-our-pathway-to-electrification#:~:text=The%20ACT%20Government%20today%20announced,over%20the%20next%20two%20decades.

²² Available here: https://www.climatechoices.act.gov.au/_data/assets/pdf_file/0006/2038497/2022_ZEV_Strategy.pdf

4.3.1 Scenarios

Evoenergy has modelled three load Probability of Exceedance (PoE) forecasts to reflect the uncertainty in actual peak demand in any given year. These are the 90%, 50% and 10% levels, where the percentage refers to the likelihood that actual peak demand exceeds the forecast in any given year. This variability is usually attributed to weather, where cold winters and hot summers result in higher than forecast peak demand (PoE 10) and mild winters and summers result in lower than forecast demand (PoE 90).

The probabilities applied to the PoE scenarios are derived from the likelihood of demand being more extreme than the scenario. A 10% probability is attached to the PoE 90 and PoE 10 scenarios and the remaining 80% to the central PoE50 scenario.

Evoenergy considers the PoE 50 scenario the most applicable to Gold Creek ZSS and have used the PoE 50 to calculate unserved energy values for the purpose of this report.

4.3.2 Maximum Demand

Maximum demand forecasts are driven by the expected new load attributable to new developments each year. Evoenergy has based the maximum demand forecast for the Gungahlin district on the latest ACT Land Release data, which provides the number of residential lots and square meters of commercial space released each year. Evoenergy has also considered developer applications in forming the number of new premises connected in the Gungahlin district.

Evoenergy has applied a one-year lag between land release and connection of a lot to the electricity network. Each residential lot is assumed to add 2.2kVA to coincident maximum demand in a PoE 50 scenario and each square meter of commercial/other space is assumed to add 0.1kVA. The residential lot estimate is an average of single dwellings and multi-unit blocks. The forecast uses very conservative estimates of coincident maximum demand and assumes very high energy efficiency of the homes and commercial spaces that will be built in the Gungahlin district. The ACT Government has requirements and incentives for developers to include EV charging points in medium and high-density developments and a plan to phase out new fossil fuel powered vehicles being purchased by 2030 as well as full electrification of the ACT by 2045 which is likely contribute to higher demand growth than forecast by Evoenergy.

Additional diversity factors have been applied on a case-by-case basis for some large loads with special characteristics. These values are based on Evoenergy's historic experience with new developments, expectations for energy efficiency of the new premises and expectation for rooftop solar PV to reduce grid electricity consumption, especially in summer months.

The maximum demand forecast increase each year is used to create a forecast annual load profile. Each 15-minute interval increased proportionally based on maximum demand growth.

The PoE 50 forecasts are developed first and the PoE 90 and PoE 10 forecasts calculated using the approach outlined in section 4.3.1 above.

For financial modelling purposes, the alignment of financial years to seasonal peaks is: FY22/23 = 2022 winter and 2022/23 summer. The maximum demand forecast can be seen in Table 7.

4.3.3 Load Profile

When assessing the financial costs and unserved energy implications of non-network submissions, Evoenergy will use the actual load profiles of Gold Creek ZSS during a 12 month period covering the 2018/19 summer and 2019 winter. This year was chosen as it represents a “normal” year and does not include years with major weather events or load impacts due to the COVID-19 pandemic. This load profile approximately aligns with FY19 and will be treated as a financial year for the assessment of options.

The use of this load profile is reasonable for forecasting because it represents actual customer electricity usage characteristics in the area, the makeup of the new developments is expected to largely reflect the existing load uses in the area and because FY19 was a typical year with no unusual or major demand events during the year.



FIGURE 5: DEMAND PROFILE OF AN AVERAGE DAY

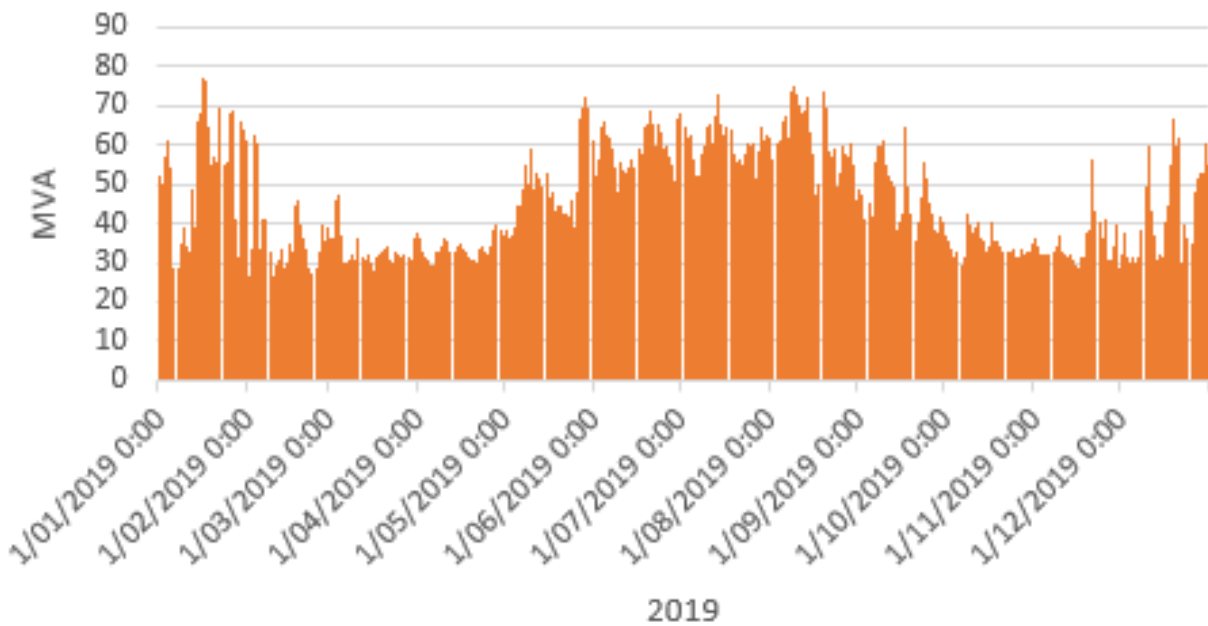


FIGURE 6: GOLD CREEK ZSS ANNUAL LOAD PROFILE

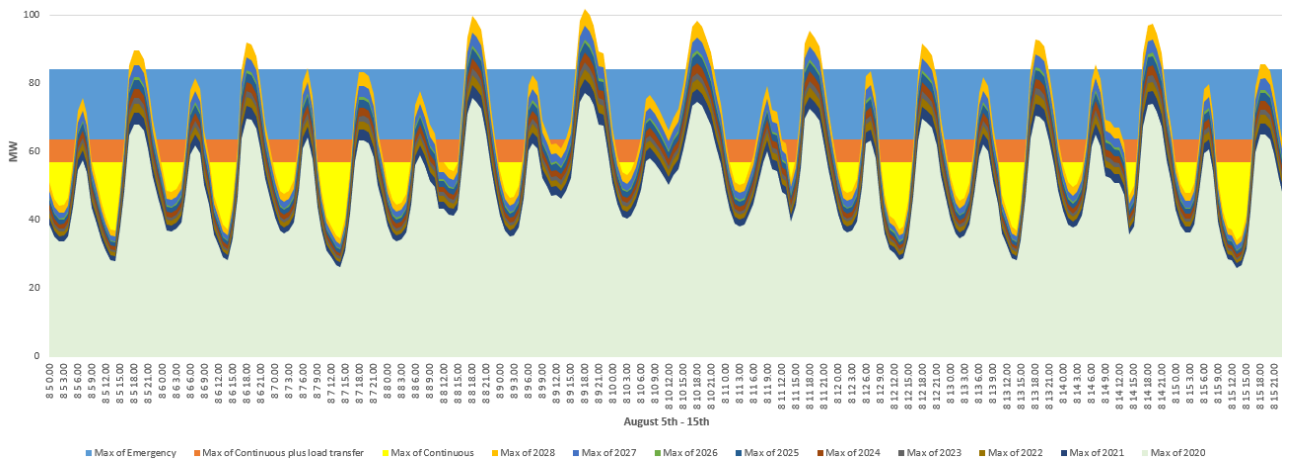


FIGURE 7: WEEK OF WINTER MAXIMUM DEMAND AT POE 50

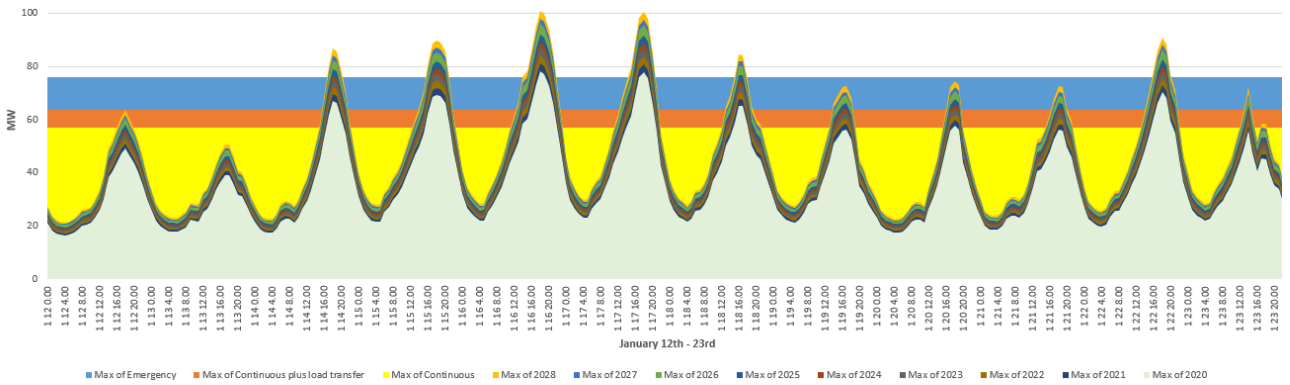


FIGURE 8: WEEK OF SUMMER MAXIMUM DEMAND AT POE 50

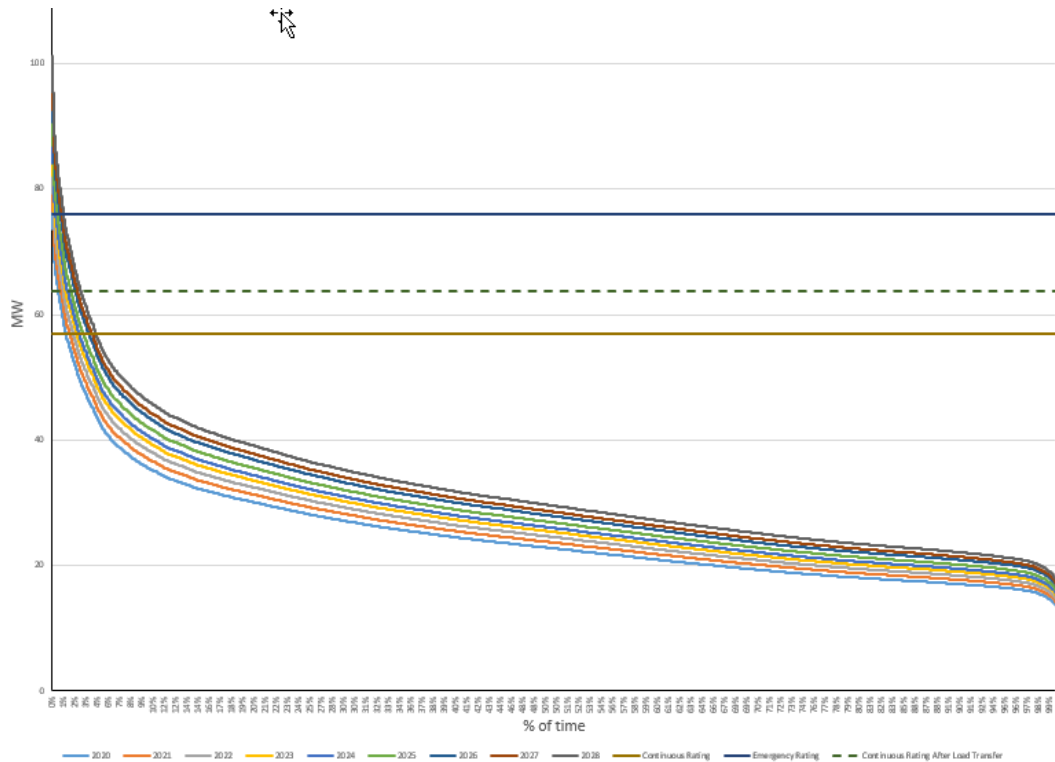


FIGURE 9: LOAD DURATION CURVE AT POE 50

4.4 Load Transfer Capability and Supply Restoration

The forecasts for maximum demand at Gold Creek ZSS include all feasible load transfers to defer the exceedance of two-hour emergency ratings. No additional load transfers are possible. Table 9 shows available load transfers.

TABLE 9: GOLD CREEK LOAD TRANSFERS

From	To	Summer (MVA)	Winter (MVA)
Gold Creek	Belconnen	3.17	14.37
Gold Creek	Civic	2.78	3.25
Gold Creek	Latham	1.79	2.10

Minimal spare capacity at nearby zone substations coupled with thermal feeder constraints in summer to provide inadequate support to Gold Creek ZSS in the event of a single contingency event.

4.5 Network Asset Failure Rate and Outage Duration

The primary driver of this project is to provide redundancy in the case of a single contingency event such as a transformer failure

The failure of a single transformer at Gold Creek zone substation may result in load shedding on some feeders in the Gungahlin district. Nearby zone substations do not have enough spare capacity to supply the resultant load.

Where a non-network solution can provide redundancy, the value of that redundancy to Evoenergy will be quantified using the asset failure and outage restoration assumptions in the table below.

TABLE 10: NETWORK ASSET FAILURE RATE AND OUTAGE DURATION

Assumption	Value
Probability of feeder failure (per annum) ²³	1%
Expected outage duration (continuous rating exceeded)	6 months
Expected outage duration (load below continuous rating)	4 hours

Outage duration is dependent on failure mode, for example, a tap changer or bushing fault may be repaired in days to weeks. Winding and other significant failures requiring rebuild or replacement of transformer could potentially take 6 months or greater.

4.6 Value of Customer Reliability

Evoenergy will use a Value of Customer Reliability (VCR) of \$32.96/kWh of unserved energy. This value was derived from the AER 2019 final report on VCR²⁴ values using the ACT residential value of \$21.39/kWh and commercial value of \$44.52/kWh. A weighting of 50% residential and 50% commercial is used in line with the Evoenergy Risk Value Framework.

The AER proposes annual escalation of VCR values using the CPI-X approach, where X is an adjustment for changes in customer preferences. Evoenergy has assumed that there will be no changes in customer preferences and VCR values will increase by CPI. Evoenergy's assessment is in real terms so there will be no change in VCR values over the assessment period.

²³ 1% chance of failure per annum is based on worst case scenario – CIGRE Transformer Reliability Survey Interim Report 2012 [TOR-WG A2_62_Analysis of AC Transformer Reliability.pdf \(cigre.org\)](https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability)

²⁴ Available here: <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/values-of-customer-reliability>

4.7 Approach to Estimating Project Costs

Evoenergy has conducted a preliminary bottom-up assessment of the capital costs of the network option. The cost of this network option will be updated during the assessment phase of the RIT-D process.

Operating costs for new assets, such as zone substations and power transformers, are estimated as a percentage of capital expenditure. The standard value used by Evoenergy is 1% of capital costs. This amount is typically used for comparison of long-lived capital asset options and is an average rate over the life of the asset. Evoenergy expects a similar amount of dollar operating costs (excluding payments to the non-network solution provider) for the management of non-network solutions and can therefore exclude these operating costs from the assessment of alternative options. An assessment of operating costs will be undertaken where there is an expectation of a significant difference in cost to Evoenergy between the two options being considered and the non-network solution provider can provide an accurate estimate of the operating costs that would be incurred by Evoenergy for their proposed solution.

5. POTENTIAL CREDIBLE NETWORK OPTIONS

5.1 Base Case (Do Nothing)

The base case would see no investment in capacity improvement at Gold Creek resulting in non-compliance with Evoenergy’s obligation under the ACT Electricity Transmission Supply Code. Furthermore, in the event of a single contingency such as transformer fault or similar, network reliability and security in the Gungahlin district would be compromised. Should a failure occur, it would likely lead to large scale unplanned outages during times of peak demand.

Failure to invest in increasing capacity at Gold Creek ZSS may result in significant unserved energy in the event of a single transformer failure, the potential unserved energy is estimated from \$2.8k in 2022 to \$1.6m in 2028. Projected unserved energy excluding load transfers and with a 1% probability of transformer failure can be seen in Table 15.

TABLE 11: GOLD CREEK ZSS UNSERVED ENERGY FOR N-1 CONTINGENCY

	2022	2023	2024	2025	2026	2027	2028	2029
Total USE (MWh)	0.08	0.66	2.14	5.47	12.63	28.45	48.83	76.89
Value of USE (\$)	2,839	21,820	70,530	180,359	416,404	937,785	1,609,323	2,533,283

As a result of Evoenergy’s obligations under the ACT Electricity Transmission Supply Code 2016, section 4.1.2: continue to allow electricity supply at maximum demand immediately and automatically after a credible contingency event and the potential unserved energy risk, the do nothing option is not a credible option.

5.2 Network Option 1 (Preferred): Installation of third transformer at Gold Creek Zone Substation

Option 1 will install and commission an additional (third) 57 MVA transformer at Gold Creek zone substation.

The scope of work includes connection to the existing 132kV bus, 132kV circuit breaker, CTs and surge diverters, 11kV transformer cables, switchboard and associated protection, monitoring and communications equipment. These works are expected to be completed and commissioned prior to winter peak 2025. This is the preferred option for the following reasons:

- Lowest NPC of acceptable network options
- Effectively doubles Gold Creek ZSS continuous and 2-hour emergency ratings
- Increases the capacity and flexibility of Gold Creek ZSS to manage the ACT government Net Zero by 2045 target and the associated load growth from full electrification and EV charging
- Lowest level of complication and community disruption from land access and construction/civil works
- Does not affect redundancy at nearby zone substations



FIGURE 10: AERIAL VIEW OF GOLD CREEK ZONE SUBSTATION

5.2.1 Technical Definition and Characteristics

Substation

The Gold Creek zone substation was commissioned in 1994 with two 132/11kVA, 57 MVA power transformers supplying 22 11kV feeders supplying the Gungahlin district. The substation was constructed with extra civil infrastructure including transformer pad, apparatus footings, switch room and cable tunnels to allow the installation of a third transformer as the load in the Gungahlin district grew. The layout of the yard can be seen in Figure 6. Current and proposed single line diagrams can be seen in Figures 7 and 8.

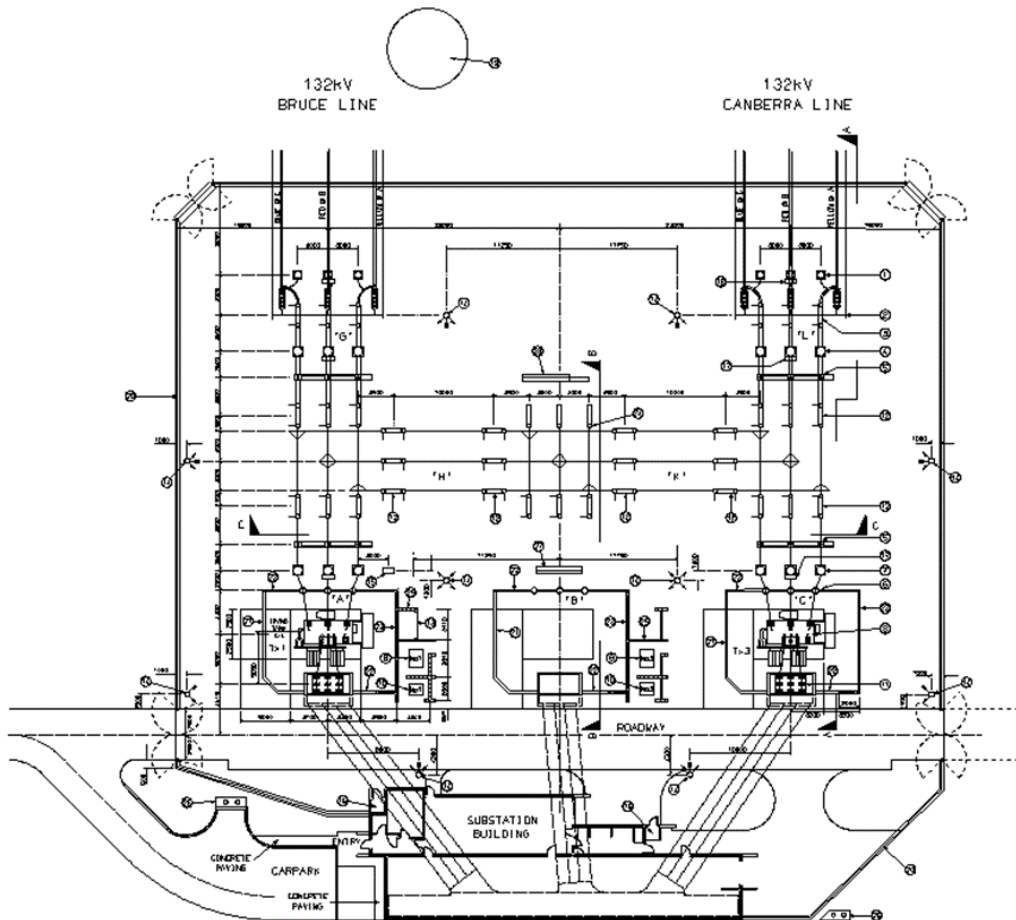


FIGURE 11: GOLD CREEK ZSS GENERAL ARRANGEMENT SHOWS SPARE CENTER BAY FOR FUTURE THIRD TRANSFORMER TX2.

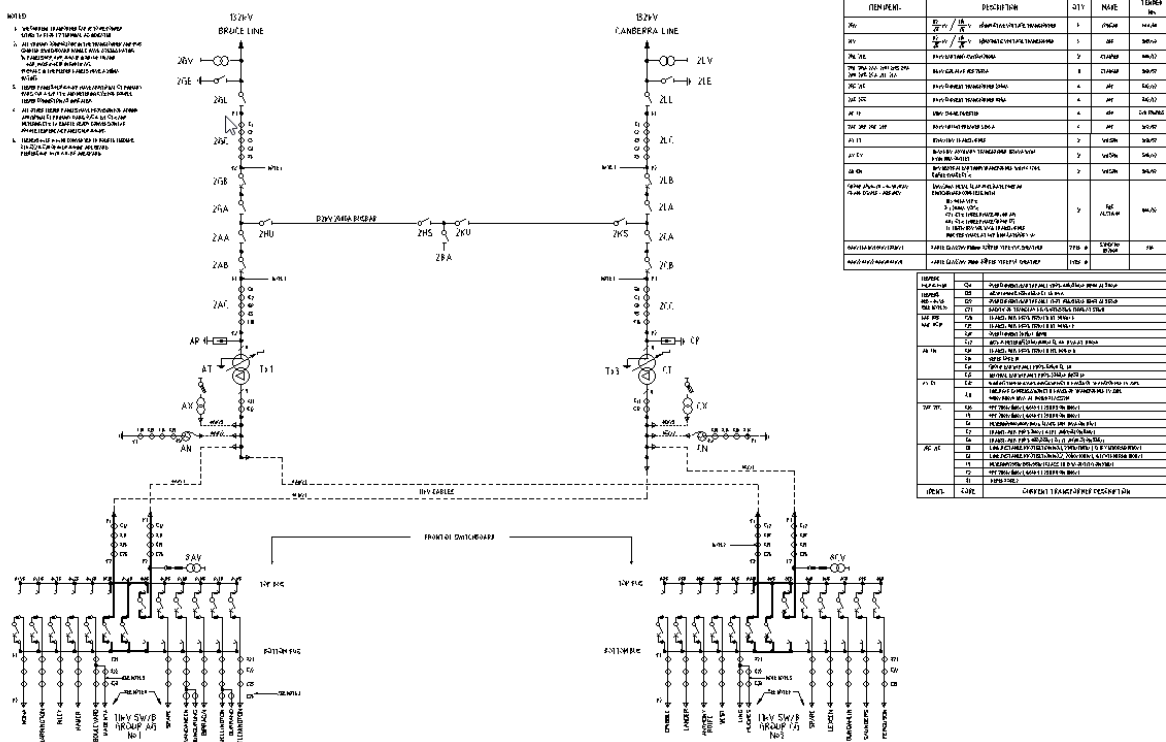


FIGURE 12: GOLD CREEK ZSS CURRENT SINGLE LINE DIAGRAM

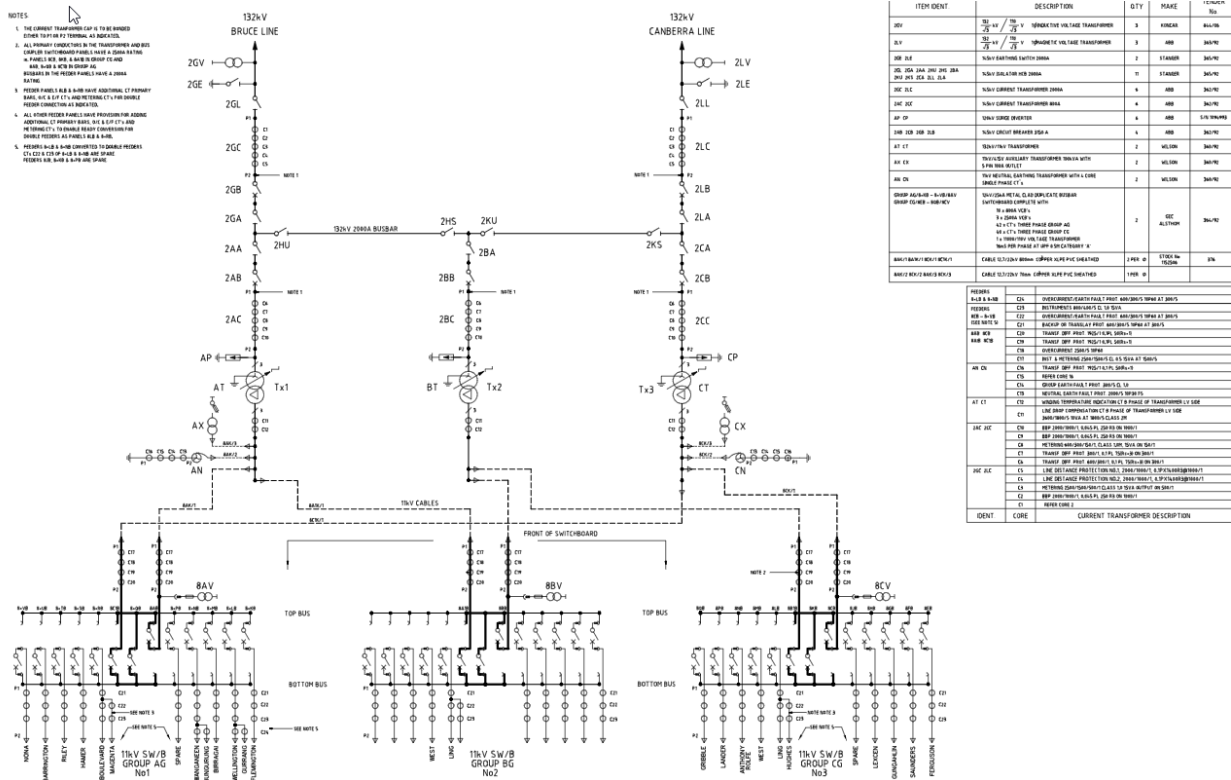


FIGURE 13: PROPOSED GOLD CREEK ZSS SINGLE LINE DIAGRAM WITH THIRD TRANSFORMER

5.3 Option 2: Accelerated construction of Mitchell Zone Substation

Network option 2 would see the construction of the proposed Mitchell zone substation brought forward by at least five years. Land earmarked for this site is no longer available and there is a long timeframe to identify and procure a suitable site. Latest estimates based on Evoenergy’s experience with the Molonglo zone substation and Harman zone substation indicate that the construction cost is expected to be \$30m, this cost is exclusive of the new 11kV feeders that could be utilised to transfer load from Gold Creek ZSS. The cost of a single feeder will exceed the cost of the preferred network option 1. The NPC of the zone substation exclusive of feeders is \$21,425,734.

Due to the project cost and the potential delay caused by land procurement, Alternative Network Option 1 is not preferred.

5.4 Option 3: Increase transfer capacity from Gold Creek to other zone substations through 11kV network

Network option 3 would increase capacity at Gold Creek ZSS by installing additional feeder ties between Gold Creek and nearby substations. Of the three nearby zone substations, Latham has adequate capacity within its’ continuous rating for installation of new feeders that could support Gold Creek.

If a feeder solution was implemented by 2025, it would need to support at least 15 MVA summer and 12 MVA winter seasonal loads in the Gungahlin district. This would require a minimum of three feeders delivering 18 MVA (thermal) capacity and would provide the N-1 redundancy of the projected load at Gold Creek through to summer 2028. For 2028 onwards further capacity will be required as the projected load grows.

Latham ZSS would require 3 additional 11 kV circuit breakers for the proposed feeders. Estimated cost for three feeders, 9km long plus circuit breakers is \$16.3m +/- 30% and would need geotechnical study to confirm ground conditions. The NPC of this option is \$12,041,302 and it may defer a third transformer for three years.

This option is not preferred due to the high cost and loss of flexibility for Latham ZSS.

5.5 NPC Comparison

Table 12 compares the NPC for network options. The base case option of zero investment offers the highest NPC, however, will cause Evoenergy non-compliance with our obligations under the ACT Electricity Transmission Supply Code 2016, section 4.1.2. and is therefore deemed unacceptable. The preferred option to install a third transformer at Gold Creek zone substation presents significantly better value than either of the two alternative network options.

TABLE 12: NET PRESENT COST COMPARISON FOR NETWORK OPTIONS

Network Option	Description	NPC (\$)
Base case (not credible)	Do nothing	-1,464,117
Option 1 (preferred)	Install third transformer	-6,480,564
Alternative Option 1	Accelerate Mitchell ZSS	-21,425,734
Alternative Option 2	Install three feeders from Latham ZSS (Defers 3 rd Tx by 3 years)	-12,041,302

6. POTENTIAL CREDIBLE NON-NETWORK OPTIONS

Evoenergy's initial assessment of non-network solutions for the Gungahlin district area has found three potentially credible non-network options. These are both based on the use of batteries to temporarily defer investment in a network augmentation.

The potential credible options assume that a battery will be installed with a primary purpose that is not to support Evoenergy's network with a commercial arrangement to support Evoenergy's network during times of peak demand. That is, the value available to defer the network option, is unlikely to be sufficient to entirely fund the required battery and additional investment drivers are likely to be required. Examples include as part of a larger energy investment project, due to a government program obligation, for wholesale electricity price arbitrage, participation in the FCAS market or as part of a back-up system for an electricity user. The majority of the battery's value will come from the primary purpose, with grid support payments providing an additional revenue stream.

Evoenergy has undertaken a preliminary evaluation of a wide range of non-network options for the Gungahlin district such as demand management and embedded generation. While these services were assessed to be less likely to deliver a credible non-network solution for the Gold Creek constraint, Evoenergy is technology/solution agnostic and seeks submissions on all solutions to defer investment at this site. This includes receiving partial solutions for Evoenergy to evaluate whether it can combine solutions to address the identified need.

6.1 Non-Network Option 1 - Batteries located within the Gungahlin load centre

6.1.1 Technical definition and characteristics

Non-Network Option 1 involves two or more batteries located within the Gungahlin District near existing loads or within new developments. Batteries must be sized and located to address the N-1 contingency described in Section 3. Approximately equal sized batteries are expected to most efficiently meet the identified need, but this is not a requirement and some locations may be better suited to smaller or larger batteries. These factors will be considered in more detail during the consultation phase as multiple battery providers may be included in a credible non-network option.

A larger number of residential or commercial 'behind-the-meter' batteries connected to the low voltage network and aggregated via a Virtual Power Plant (VPP) scheme may also meet Evoenergy's requirements, either as a standalone solution or paired with a larger 11kV connected battery. Such an arrangement may spread the batteries across a larger geographic area and prevent local constraints from limiting the effectiveness of the batteries to discharge during network peak events.

The non-network provider will be responsible for all connection costs associated with this option. These costs can be estimated once a credible proposal is identified by Evoenergy. Connection costs will include design, materials, construction and commissioning.

6.1.2 Estimated construction timetable and commissioning date

The batteries and any other solution component must be operational by 1 April 2025 to address the winter 2025 peak. Submissions should detail the proposed timeline, inclusive of the network connection process.

6.2 Non-Network Option 2 – Single large battery located close to Gold Creek ZSS

6.2.1 Technical definition and characteristics

Non-Network Option 2 involves a single large battery located near the Gold Creek ZSS with direct 11 kV connections such that either power transformer could be supported by the battery in the event of an N-1 contingency such as a transformer failure. Evoenergy understands that 6 MW is a standard battery size and for the purpose of description in this report, multiple 6 MW batteries at a single location are considered a single large battery.

As the battery will be located away from the load centre, there will be limited opportunities for the battery to provide network support services after third transformer is installed. The non-network provider will be responsible for all connection costs associated with this option including, but not limited to: 11 kV circuit breakers within the zone substation, switching station near the battery and associated design, materials, installation and commissioning.

6.2.2 Estimated construction timetable and commissioning date

The battery and all elements of the battery system must be operational by 1 April 2025 to address the winter 2025 peak. Submissions should detail the proposed timeline, inclusive of the network connection process.

6.3 Non-Network Option 3 – Demand management

Evoenergy will consider credible demand management options that will address the identified need. Any demand management option must be able to support both transformers at Gold Creek ZSS and would need to be spread across a significant number of feeders. This would require any solution to be applicable to both domestic and commercial loads.

6.3.1 Estimated implementation timetable

The demand management solution must be operational by 1 April 2025.

7. TECHNICAL INFORMATION FOR NON-NETWORK OPTIONS

7.1 General

Non-network providers must:

- Be responsible for identifying and acquiring land to locate any non-network option. Due to site constraints Evoenergy is not able to offer land at Gold Creek Zone Substation,
- Meet the timelines provided by Evoenergy in section 8.3.1,
- Pay for connection costs as per the Evoenergy's connection policy²⁵

7.2 Target Area

Non-network solutions must be located such that they are able to support the capacity of the existing Gold Creek ZSS.

Distributed non-network solutions, such as demand management, should be spread throughout the Gungahlin district, ideally able to support all 22 existing feeders. Distributed solutions that are contained to a small portion of the area (such as a few large loads in a commercial area) may not be able to manage constraints on the ZSS to the degree required so are unlikely to be assessed as appropriate.

Centralised or partially centralised non-network solutions, such as large batteries or embedded generators, should be located close to the load centre and near the feeder ties to be most effective.

²⁵ Available here: <https://www.evoenergy.com.au/-/media/evoenergy/documents/connection/connection-policy.pdf?la=en&hash=719434FEE32151D0403F3C62C81D92FFDA68B2A0>

Evoenergy will also consider non-network solutions located near the Gold Creek Zone Substation site, however, Evoenergy is unable to provide any portion of this site to accommodate a non-network solution.

7.3 Investment Timing Requirements

Evoenergy’s forecast for the Gold Creek Zone Substation indicates that the identified network solution is to be operational by 1 April 2025.

The non-network solution must enable Evoenergy to defer the transformer installation by at least one year to April 2026. This requires the non-network solution to sufficiently reduce the peak demand for the 2025 winter peak as well as the 2025/26 summer peak.

Where the non-network solution involves batteries or embedded generators, submissions should account for the connection approval process timelines as per the National Electricity Rules. Evoenergy will follow its standard processes for approving connections and is not able to offer expedited approval timelines for submissions responding to this report.

7.4 Technology Specific Requirements

7.4.1 Size and capacity

Evoenergy has used a probabilistic model to identify battery system capacities to mitigate the expected load beyond the 2-hour emergency rating of Gold Creek ZSS in the event of a transformer failure. This modelling assumes the battery is fully dedicated to network constraint management during an N-1 contingency event.

Both the MW discharge rate and MWh capacity of the battery are necessary to evaluate the effectiveness of a battery system solution to meet the network constraint.

The table below shows the calculated battery system capacities to mitigate exceedance of zone substation emergency ratings in the event of a transformer failure. This analysis is based on a PoE 50 load forecast.

TABLE 13: BATTERY CAPACITY REQUIRED FOR EACH YEAR OF DEFERRAL

FINANCIAL YEAR	RATING (MW)	STORAGE (MWH)	STORAGE (HOURS)
2024/25	11	37.6	3.4
2025/26	15	65.6	4.4
2026/27	18	92.5	5.1
2027/28	21	123.8	5.9

7.5 Available Funds for Deferral

The available funds for deferral are determined by the financial benefits to Evoenergy of deferring capital expenditure. For the identified need in the Gungahlin district, the deferral benefit is made up of two components, avoided financing costs and avoided depreciation of capital assets.

Deferral benefits are calculated annually. The proposed option must defer at least part of the network option build from FY24/25 to FY26/27, FY27/28 or beyond (beyond FY27/28 is considered extremely unlikely).

Deferral of components of the installation of a third transformer and associated works at Gold Creek ZSS will avoid financing costs incurred by Evoenergy during the period of deferral. Evoenergy has calculated these deferral benefits using the WACC approved by the AER in the 2019-24 regulatory determination.

Deferral will also reduce depreciation of capital assets during the deferral period. Evoenergy uses a 40-year depreciation lifetime for substation assets and a 50-year lifetime for distribution lines. The deferral benefit for an investment deferred by one year is calculated as: $value * WACC + value / lifetime$.

For simplicity, OPEX costs incurred by Evoenergy to manage the non-network option are assumed to be equal to incremental OPEX costs that the network investment would have required. Network assets generally do not require OPEX when they are new so the value of OPEX for the network option would be low during the deferral period.

The available funds for deferral are required to cover both payments to the non-network service provider, unserved energy costs and any risk margin required by Evoenergy.

The maximum payment to a non-network service provider will depend on the expected unserved energy the service will result in. As Evoenergy uses probabilistic planning and does not have deterministic planning compliance obligations, there is no requirement for a service provider, or Evoenergy, to reduce expected unserved energy to zero. Funds available for deferral are listed in Table 14.

TABLE 14: FUNDS AVAILABLE FOR DEFERRAL OF GOLD CREEK THIRD TRANSFORMER

DEFERRAL PERIOD	DEFERRAL DATES	DEFERRAL VALUE (\$)
1-year deferral	April 1 2025 to April 1 2026	211,980
2-year deferral	April 1 2025 to April 1 2027	416,465
3-year deferral	April 1 2025 to April 1 2028	613,691

The table above shows the maximum value of deferral to Evoenergy in FY22/23 present value terms. The range covers the uncertainty in the preliminary cost estimates for the base case network option and does not incorporate uncertainty in other variables such as demand growth and uncertainty in the effectiveness of the non-network solution.

The deferral value calculation only considers costs that are avoidable by Evoenergy during the deferral period and not the total cost of the preferred network option.

If there are no additional costs to Evoenergy (including unserved energy costs, administration costs and risk margins) a non-network solution provider can receive total payments, in present value terms, up to the amounts presented in the table. This could be as a once off payment, but is more likely to be structured as an availability payment plus a variable component linked to the actual usage of the non-network solution by Evoenergy. Evoenergy will consider and negotiate pricing structures included in a submission.

8. SUBMISSIONS

This section provides non-network providers with an invitation for submissions, guidance on how to make submissions, and supporting information. Submissions are intended to provide non-network providers and interested parties with an opportunity to propose how they could address the identified need through alternative potential credible options.

8.1 Invitation for Submissions

Evoenergy is seeking submission from interested providers of credible non-network options that either partially or completely address the identified need outlined within this NNOR.

All submissions should completely and comprehensively address the required information listed in Section 8.2 and include information listed within Evoenergy’s Demand Side Engagement Strategy²⁶.

Where additional information is required by a non-network provider in addition to that provided in this report, it is recommended that non-network providers contact Evoenergy as early as possible to allow adequate time for response.

Requests for additional information will be anonymised and published with Evoenergy’s response on the Evoenergy website. Initial responses will be provided within 10 days. Non-network providers are encouraged to regularly check the website as it will be updated with frequently asked questions (FAQs) during the submission period.

All requests for additional information and lodgement of submissions should be directed to:

²⁶ Page 10 of Evoenergy Demand Side Engagement Strategy, 2018, available here: <https://www.evoenergy.com.au/emerging-technology/demand-management>

Email: RIT@Evoenergy.com.au

The period for additional information closes on 4 November 2022 at 5 pm

Submissions must be lodged by 28 November 2022 at 5 pm

All submissions will be published on the Evoenergy website unless otherwise requested. Please indicate if you do not wish to have your submission published in part or in full.

8.2 Information from Non-Network Providers

Each submission must provide sufficient information and detail for Evoenergy to determine that the proposed non-network solution is feasible. To be considered feasible, any non-network solution must be technically feasible, commercially feasible and able to be implemented in sufficient time for deferral of the network investment. In the absence of any viable solutions, the preferred network solution is to be commissioned before winter 2025.

Evoenergy is seeking proposals that provide sufficient detail about the type and likely scale of non-network solutions offered by market providers. Respondents are not required to provide detailed costing of proposed solutions in response to this report, however, proposals should include as much information as possible.

Non-network providers must make a submission using the DER Portal²⁷ This includes the following information as a minimum:

1. Non-network provider name and contact details,
2. Overview of the proposal and the extent to which it addresses the identified need,
3. A technical description, including but not limited to:
 - a. Location(s), site plan, and specifically if the non-network solution is contained within the target area,
 - b. Size of the peak load reduction (including any standards/methodologies relied upon to determine the load reductions) or additional supply capacity (temporary or permanently connected generators) offered
 - c. Electrical layout schematics/single line diagram (if applicable),
 - d. Network connection requirements (if applicable),
 - e. Contribution to power system security or reliability,
 - f. Contribution to power system fault levels and load flow and stability studies (if applicable),
 - g. Operating profile,
 - h. How each of these matters is consistent with applicable technical standards, and
 - i. A backup plan in the event of a battery failure (if applicable).
4. Implementation timeline, estimated lifespan and key milestones,
5. Measurement and verification procedures,
6. Proposed operational and contractual commitments, including financier commitments,
7. Planning application information (where required),
8. List of services and prices to be provided which may include:
 - a. Availability payment (payment which guarantees availability of the non-network option regardless of whether it is required or not);
 - b. Demand reduction in terms of maximum power (\$/kVA) and/or energy delivered (\$/kWh); or
 - c. Total cost to provide services to meet identified need
 - d. Other more detailed/complex service offerings and price schedules
9. Required notice time for availability (and any impact on prices for services where this notice time is not provided),
10. Potential risks associated with the proposal and a comparison with the risks associated with the deferred network augmentation option, and any actions that can be taken to mitigate these risks. This assessment should address the risk of not meeting the demand requirement and the compensation arrangements that would apply in such circumstances, and
11. Testimonials.

Non-network providers may be invited to present their proposals to Evoenergy as part of the evaluation process.

²⁷ <https://www.evoenergy.com.au/emerging-technology/embedded-generation/distributed-energy-resource-register>

Evoenergy will review each non-network option proposal and may seek further information from the non-network provider to better understand the design of the proposed solution and its impacts on the network and other network users.

8.3 Next Steps

Following the publication of the NNOR, non-network providers will have a period of 3 months to collate the information required and provide submissions to Evoenergy for non-network solutions to achieve or partially achieve the identified need.

The RIT-D process from this point involves the following upcoming activities:

1. A public briefing session is held to provide answers to non-network providers' questions about the NNOR content.
2. Submissions close for non-network providers to submit non-network option proposals.
3. Consultation with the preferred non-network provider(s) is undertaken.
4. A final project assessment report²⁸ is released.
5. Contracts with non-network providers is confirmed (where applicable) or a network option is progressed.

Evoenergy strongly recommends that non-network providers also commence engaging in the connection process early, to optimise alignment of timing with the identified need as well as with processing times.

8.3.1 Timeline

An overview of the timeline, from the publication of this NNOR to when the preferred option is required to be operational, is provided in Table 15 below.

TABLE 15: TIMELINE

ACTIVITIES	DATES
Publish NNOR and request for submissions ²⁹	30 August 2022
Consultation period ³⁰ for non-network providers to provide submissions	30 August 2022 - 28 November 2022
Public briefing session during consultation period – Details to be confirmed	September 2022
Evoenergy review of submissions received (non-network proposals)	November 2022
Publish final project assessment report ³¹	January 2023
Preferred option operational	April 2025

8.3.2 Documents

Documents that are intended to be released include:

- FAQs document,
- Final project report.

VERSION CONTROL

VERSION	DETAILS	APPROVED
1.0	Release version	Leylann Hinch

²⁸ As per NER clause 5.17.4(o)-(s)

²⁹ Evoenergy will notify registered parties on DSE-RIP form as per NER clause 5.17.4(g), available from <https://www.evoenergy.com.au/emerging-technology/demand-management>

³⁰ Not less than 3 months in duration from notifying registered parties on DSE-RIP as per NER clause 5.17.4(h)

³¹ As soon as practicable after the end of the consultation period as per NER clause 5.17.4(p)

DOCUMENT CONTROL

DOCUMENT OWNER	PUBLISH DATE	REVIEW DATE
Strategy & Operations	30 August 2022	N/A