Options Evaluation Report (OER)

Supply to Panorama Area
OER- **N2746** revision **1.0**

Ellipse project no(s):

TRIM file: [TRIM No]

Project reason: Reliability - To meet overall network reliability requirements

Project category: Prescribed - Augmentation-Sub Sys

Approvals

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Date submitted for approval	24 November 2022	

Change history

Revision	Date	Amendment
0	**21/10/2022**	**Initial Issue**
1	**24/11/2022**	**Unserved energy calculation and Base Case updated.**

Executive summary

A Need has been identified to provide a suitable supply arrangement to facilitate a large industrial load planning to connect in the distribution network in Panorama area. This Need is required to meet or manage the expected demand in the Panorama area while meeting the requirements of NER and System Standards to maintain systems voltage within acceptable limits.

McPhillamys Gold Mine project is located in the Central Tablelands region of New South Wales 20 km west of Bathurst and 27 km south-east of Orange as indicated in Figure 1. This mine load was planning to connect to the existing electricity network through the Essential Energy's distribution network.

In response to a DNSP work request received from Essential Energy, Transgrid completed a feasibility study to provide different connection arrangement for the mine load to connect via the distribution network[1]. Another DNSP work request was received from Essential Energy (dated 07/03/2022) to provide a 132 kV supply to connect the mine load[2]. Increased loading up to 35 MVA for the mine was provided by Essential on the 20/7/22. Followed by further discussions between Transgrid and Essential Energy it has been decided to consider the potential network solutions to address the identified need.

As above a Need has been identified to provide a suitable supply arrangement to meet or manage the expected demand for prescribed transmission services while maintaining the system standards within acceptable limits when accommodating the additional demand increase. This need has to be addressed to meet and comply with the NER requirement of Joint Planning and Prescribed transmission services while meeting the NER and System Standards to maintain voltages within acceptable limits.

Table 1 list the options being considered, their costs and summary of the commercial evaluation.

Table 1 - Evaluated options

Option	Description	Direct capital cost ($m)	Network and corporate overheads ($m)	Total capital cost[3] ($m)	Weighted NPV (PV, $m)	Rank
Option A	Build a new 66 kV line switchbay and two 132 kV Capacitor Banks at Panorama 132/66 kV Substation[4]	17.0	1.6	18.6	1,351	2
Option B	Build a new 132 kV switch bay at Panorama 132/66 kV substation and double circuit the existing Line 948 from Panorama to near structure No. 60 - approx. 18km	25.9	2.1	28.0	1,172	3

[1] Feasibility Report submitted to Essential Energy
[2] DNSP work request 7/3/2022 received from Essential Energy
[3] Total capital cost is the sum of the direct capital cost and network and corporate overheads. Total capital cost is used in this OER for all analysis.
[4] Option A also involves 66 kV feeder upgrade works associated with Essential Energy.

Option C	Development of new 132 kV Switching Station and cut-in to Feeder 948	14.8	1.0	15.8	1,353	1

The major augmentation project planned for Central West transmission network, "Supply to Bathurst Orange Parkes (BOP)", has been taken into account in the analysis carried out for the Base Case of the identified need. As part of the scope of BOP augmentation works, a non-network solution ([redacted] Battery Energy Storage) has been proposed to be in service at Panorama by [redacted] from which reactive power support can be procured by Transgrid to alleviate the existing network constraint to some extent.[5]

Further, Option A in Table 1 would incur additional costs to upgrade Essentials 66 kV network that is not include in the above assessment as it's not the preferred network option, Essential has advised the total cost of the upgrade would be $12-18m of which Essential high level funding contribution was estimated at $2.5m-3.5m. These costs are not applicable to the other options.

The final preferred option will be determined through the RIT-T process based on detailed network analysis and the assessment of technical and economic feasibility. However, based on the evaluation of the options in this report, the preferred network option is Option C – Development of new 132 kV Switching Station and cut-in to Feeder 948.

Option C has been selected as the preferred option based on the following reasons:

- Meets the requirements of the identified need with the lowest amount of augmentation works compared to the other two options;
- Lowest capital expenditure;
- Provides provision to future network expansion in terms of capacity and voltage
- No additional reactive support is required.

It is therefore recommended that the project be approved to proceed to a RIT-T assessment, with a view to the preferred option being implemented by 2025/26.

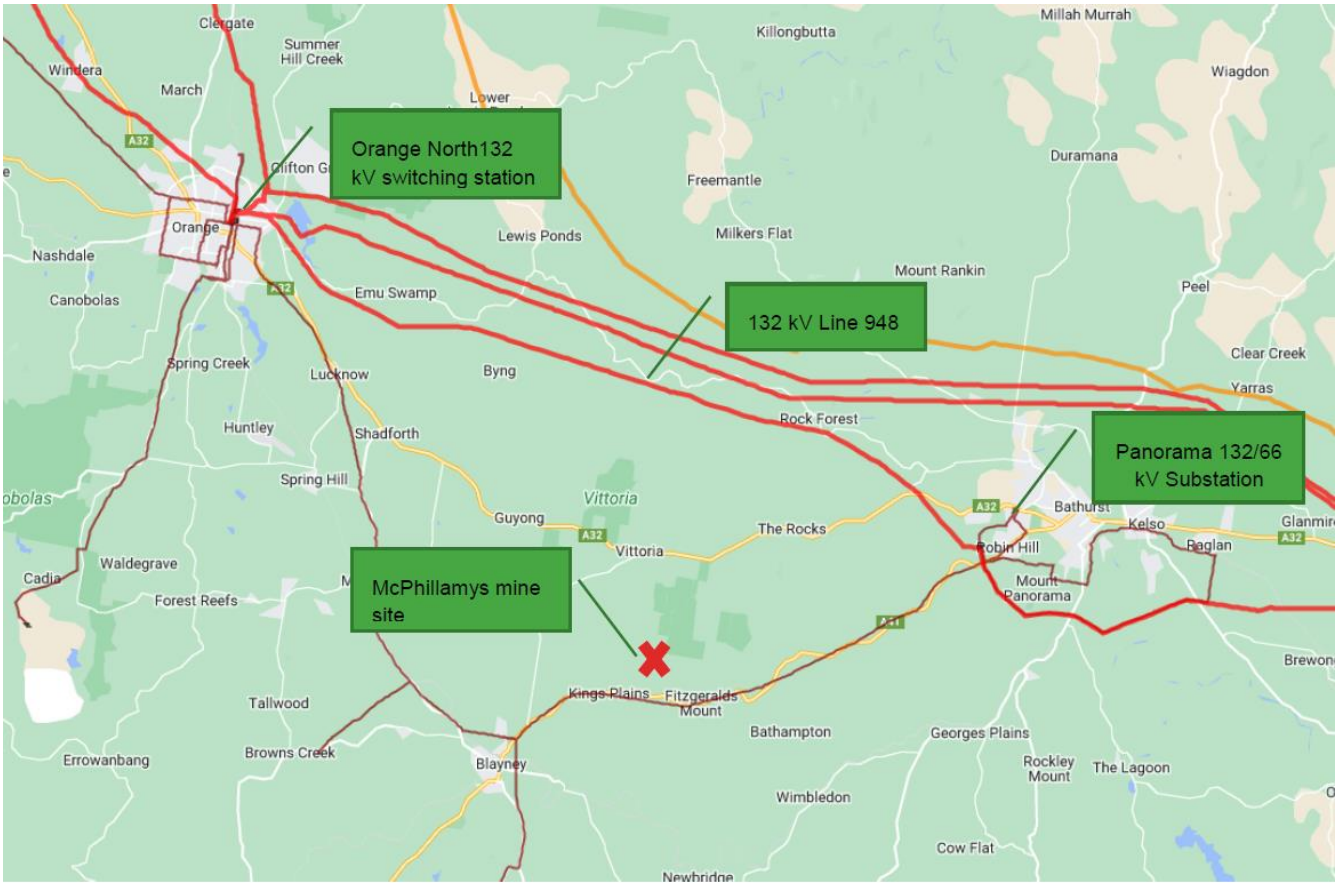
Based on the options listed in Table 1, it is expected that this Project would incur a capital cost of approximately $15.8 million.

[5] Maintaining Reliable Supply to the Bathurst, Orange and Parkes areas RIT-T – Project Assessment Conclusion Report June 2022

1. Need/opportunity

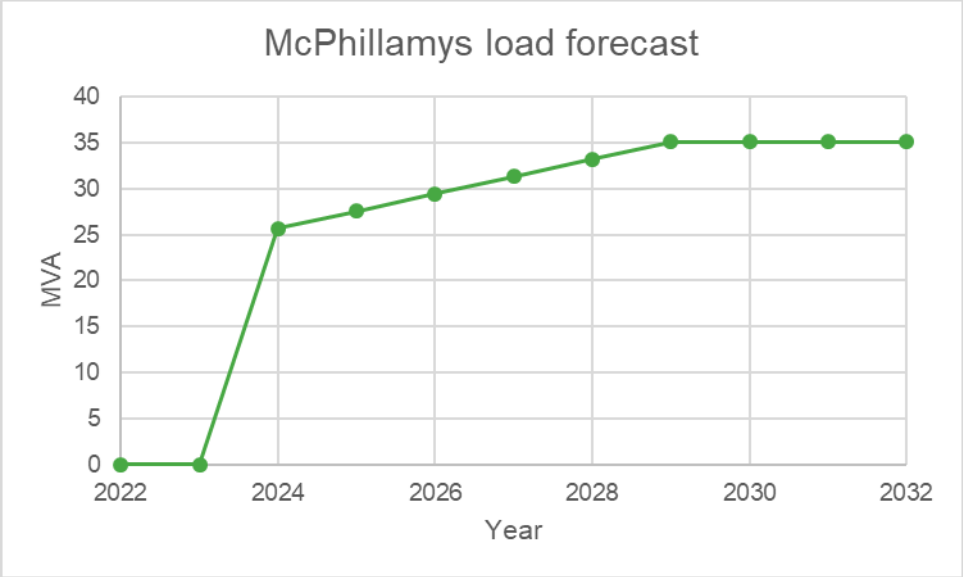
A Need has been identified to provide a suitable supply arrangement to facilitate a large industrial load planning to connect in the distribution network in Panorama area. This Need is required to meet or manage the expected demand in the Panorama area.

Figure 1: Transmission network in Central West NSW and location of the McPhillamys mine



McPhillamys Gold Mine project is located in the Central Tablelands region of New South Wales 20 km west of Bathurst and 27 km south-east of Orange as indicated in Figure 1. This mine load is currently planning to connect to the existing electricity network through the Essential Energy's distribution network. Figure 2 illustrates the demand forecast of the new mine load.

Figure 2: Demand forecast of McPhillamys mine



As a Compliance Requirement stipulated by the NER, Transgrid is required to perform Joint Planning with the relevant DNSPs to manage the demand and provide prescribed transmission services. Transgrid received a DNSP work request from Essential Energy (dated 18/08/2021) under the prescribed services to investigate the connection options for the McPhillamys mine load[6]. In response, Transgrid submitted a technical feasibility report to Essential Energy outlining the feasible options to connect the existing transmission network[7]. Another DNSP work request has been received from Essential Energy (dated 07/03/2022) to provide a 132 kV supply to connect the mine load[8]. Increased loading up to 35 MVA for the mine was provided by Essential on the 20/7/22 as shown in Figure 2. Followed by further discussions between Transgrid and Essential Energy it has been decided to consider the potential network solutions to address the identified need.

"Supply to Bathurst Orange Parkes" (BOP) the augmentation project is planned to address the existing voltage constraints in the area and Stage 1 of this project involves installation of [redacted] Battery Energy Storage System from which Transgrid would procure the reactive support for the shared network. The demand growth up to 26 MW has been considered under Supply to Bathurst Orange Parkes project, however the capital expenditure involved with the supply arrangement for the mine load has not been taken into account in BOP. Therefore, despite the reactive support provided by the BOP project, a suitable connection arrangement is required to be provided to facilitate the connection of the McPhillamys mine load hence meet the demand increase as per the latest demand forecasts.

As above a Need has been identified to provide a suitable supply arrangement to meet or manage the expected demand for prescribed transmission services. This need must be addressed to meet and comply with the NER requirement of Joint Planning and Prescribed transmission services.

[6] DNSP work request dated 18/8/2021 received from Essential Energy
[7] DNSP Connection Feasibility Report McPhillamys Mine October 2021
[8] DNSP work request 7/3/2022 received from Essential Energy

2. Related needs/opportunities

- N2284 – Supply to Central West Load Growth:

This Need has raised a project to implement network or non-network solution to improve the voltage support in the Central West area to support the anticipated demand growth. Currently the project is undergoing the RIT-T assessment. This need partially addresses the underlying system needs and has been included in the Base Case of this identified need in this document.

- N2194 – Supply to Orange Load Growth:

This Need has raised a project to install a 66 kV 10 MVAr capacitor bank at Panorama 132/66 kV substation and a 132 kV 10 MVAr capacitor bank at Orange North 132 kV switching station to support the voltage stability limit. This project has been included in the base case. Expected timing of completion: October 2023

- N2404 – Transformer Refurbishment Project (Panorama transformer replacement OER N2404 PNM)

As part of this Need, a project has been raised to replace the No.2 132/66 kV transformer at Panorama 132/66 kV substation. The replacement project has been initiated due to the end of serviceable life of the No.2 transformer. As per the OER N2404 (Panorama), the scope of the preferred option includes 132 kV busbar extension and to the east on the existing bench and utilise the space available on the bench for the new No.2 transformer.

3. Options

3.1. Base case

The base case of this need is to allow connection of McPhillamys to the existing 66kV distribution network while the augmentation works related to the Supply to Bathurst Orange Parkes (BOP) projects continues as planned.

The existing distribution network has limited capacity to accommodate the demand increase hence, the mine load will not be able to operate up to the expected maximum demand level of 35 MVA. This is due to the limited thermal capacity in the Essential Energy's 66 kV feeder outgoing from Transgrid Panorama substation.[9] The rearrangement of the distribution network would enable maximum of 19 MVA headroom to support additional demand growth supplied from existing Panorama 66 kV BSP. Therefore, in the Base Case the headroom of 19 MVA can be utilised to supply the McPhillamys mine load given the mine load will need to be constrained off beyond 19 MVA causing significant amount of unserved energy levels.

Figure 3 illustrates the load duration curved (projected for McPhillamys using historical data of a similar industrial load and McPhillamys demand forecast). The energy required to be constrained due to the existing distribution constraint is shown by the area under the duration curve and the maximum allowable additional load growth at Panorama limited by the existing distribution constraint.

[9] Essential Energy Distribution Annual Planning Report 2021

Figure 3: Load duration curve (projected) for McPhillamys mine and expected unserved energy

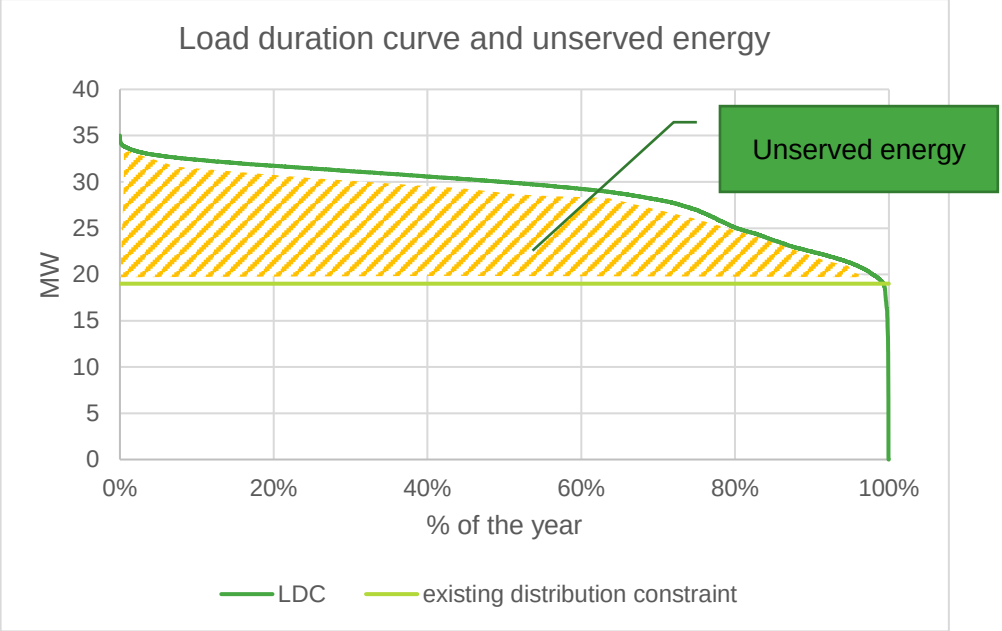


Figure 4 shows the Summer peak demand forecast at Panorama 66 kV BSP which includes the McPhillamys load. As Figure 4 illustrates, due to the existing distribution constraint, McPhillamys load will not be able to operate to its maximum demand level without network augmentations. Therefore, if the McPhillamys mine load connects to the underlying distribution network supplied from Panorama, large amounts of demand levels must be constrained off under system normal conditions hence would lead to significant amount of unserved energy.

Figure 4: Summer peak demand forecast at Panorama 132/66 kV substation

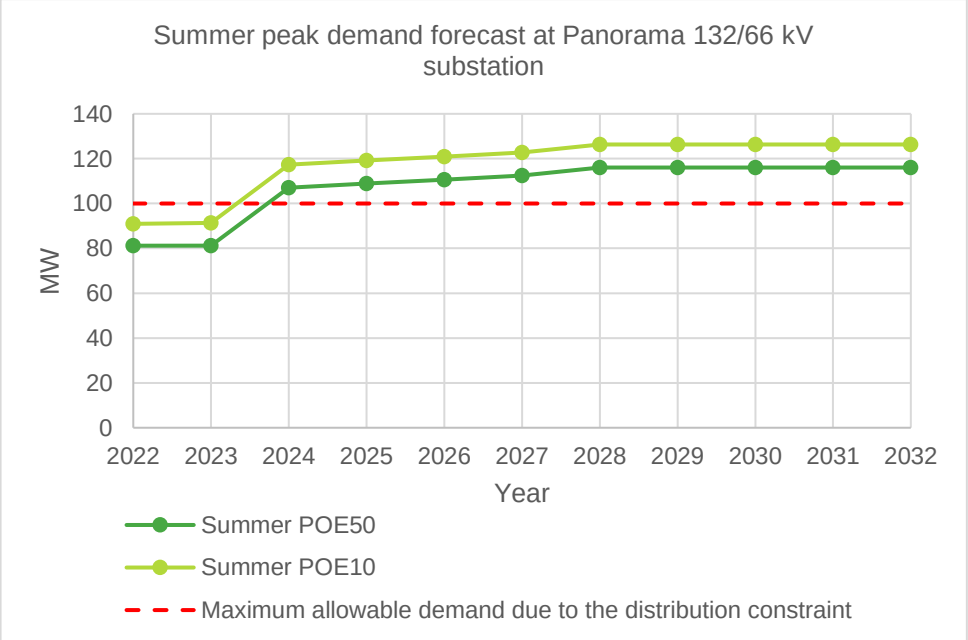
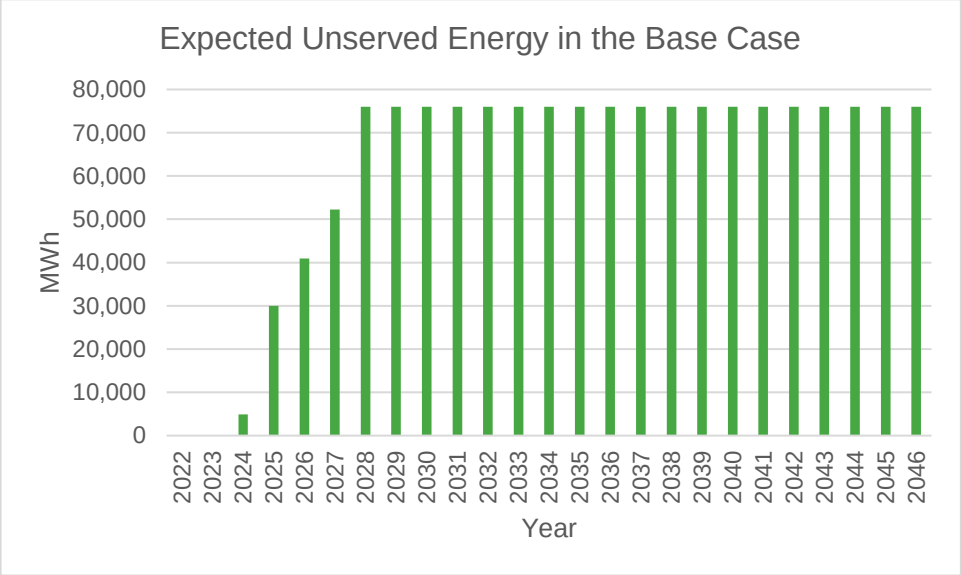


Figure 5 illustrates the Expected Unserved Energy (EUE) associated with McPhillamys mine over the 25 years of analysis.

Figure 5: Expected Unserved Energy (EUE) in the Base Case with the expected demand forecast for McPhillamys mine load



3.2. Options evaluated

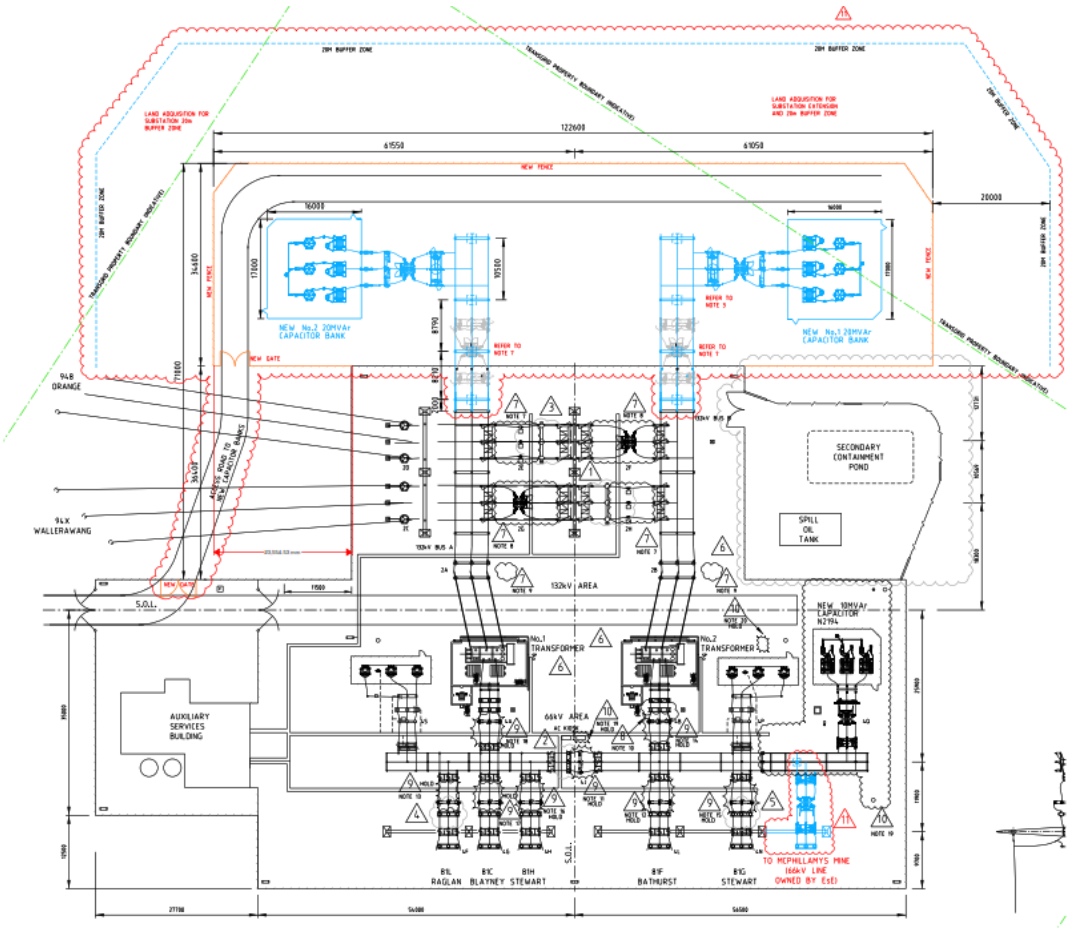
Option A — Provide a new 66 kV switch bay and install two (2) 20 MVAr/ 132 kV capacitor banks at Panorama 132/66 kV substation [NOSA N2746, OFS 2746A Rev 2]

Under this option it is proposed to establish a new 66 kV switch bay at the existing Panorama 132/66 kV substation to which Essential Energy could connect a new 66 kV line. Further to the new 66 kV switch bay, to improve the voltage support in the area and accommodate the demand increase due to McPhillamys mine beyond 25 MVA, two (2) 20 MVAr/ 132 kV capacitor banks are required to installed at Panorama.

In addition to the augmentation works at Panorama as above, in order to supply the mine load under this option, Essential Energy's existing outgoing 66 kV feeder 81C needs to be upgraded (re-build as a double circuit or a high capacity feeder). Essential has advised the total cost of the upgrade would be $12-18m of which Essential high level funding contribution was estimated at $2.5m-3.5m. Essential costs have not been included in this OER analysis but if this option becomes preferred Essential costs will need to be added.

Figure 6 illustrates the Panorama 132/66 kV substation layout with the augmentation works associated with Option A (shown in blue – only Transgrid scope of works) and the connection arrangement of the new 66 kV feeder which will be owned and operated by Essential Energy. The proposed point of connection will be the load side of the switch bay for the 66 kV feeder at Panorama substation.

Figure 6: General Arrangement (GA) of the proposed augmentation works in Option A



Although this option carries benefits of utilisation of available spare capacity of the existing transformers (2 x 120 MVA) at Panorama and minimum/no additional cost of 66 kV busbar extension as it has been covered by N2404 (or N2194) already, there are other augmentation works associated with the installation of the proposed capacitors.

The high level scope of works for Option A include the following at Panorama 132/66 kV Substation:

- New gantries for new 66 kV feeder connection
- Construct 1 off new 66 kV line switchbay for the new feeder connection
- Replacement of structure 222, 221 and 220 on feeder 94X for clearance to ground from slack span to bench extension
- Replacement of structure 1 on feeder 948 for clearance to ground from slack span to bench extension
- Bench extension at 132 kV yard
- Construct 2 off new 132 kV 20 MVAr capacitor banks with associated 132 kV switchbays and connection to existing 132 kV rigid bus

The expected commissioning date for this option is 2025/26.

The expected Transgrid's capital expenditure profile for this option has been obtained from the Transgrid's Standard Cost Estimating System is as per Table 2. The estimates in Table 2 below includes an uncertainty of ± 25%.

Table 2: Projected expenditure profile (Transgrid cost ONLY)) for Option A

	Total Project Base Cost ($m)	2022/23 ($m)	2023/24 ($m)	2024/25 ($m)	2025/26 ($m)
Estimated Cost – non-escalated	18.6	0.5	5.2	8.8	4.1

It is estimated that an amount up to $1.5 million is required to progress the project from DG1 to DG2 and this cost has been included in the expenditure provided in the Table 2. This is to cover activities such as site assessments, development of concept design, the commencement of project approvals and the early procurement of long lead-time items if required.

This project is expected to be completed in an estimated 32 months following the approval of DG1.

Option B — Build a new 132 kV switchbay at Panorama; double circuit the existing Line 948 approx. 18km towards Orange [NOSA N2746, OFS 2746B Rev 1]

This Option proposes to establishment of a new 132 kV line switchbay and a new 132 kV overhead line connected to the new switchbay, re-building the existing 132 kV Line 948 for approximately 18 km from west (approx. up to Structure No. 60) towards Orange North. The proposed new double circuit will end at this location where the new 132 kV feeder on the double circuit will be joined with a newly built Essential Energy owned 132 kV overhead line which would run down to the McPhillamys mine substation. The newly built Line 948 from Panorama to the end of the double circuit will be connected to the existing 948 Line section towards Orange North 132 kV switching station.

The proposed location for the works under Option B is shown in Figure 7.

Figure 7: Indicative location of the proposed switching station in Option B

The high-level scope of the Option B is as below:

- Extend the switchyard bench to west to accommodate a new 132 kV busbar;
- Build a new 132 kV busbar on the west of existing 132 kV switchyard on the extended bench;
- Remove part of the 132 Bus A and add a new 132 kV CB to convert the existing 4 CB mesh arrangement to a breaker and half arrangement;
- Augmentation of associated civil works and secondary systems to accommodate the new busbar configuration.

This project has the potential to have a significant impact on the environment in accordance with Section 111 of the EP&A Act and is likely to be assessed as State Significant Infrastructure (SSI). As a result, this project will require an Environmental Impact Statement (EIS) to be prepared with the NSW Department of Planning, Industry and Environment (DPIE) as the approval authority. Significant biodiversity offset payments are expected due to land clearing activities associated with the construction of new transmission lines. Further, this option requires substantial land acquisition for new transmission lines as detailed in Section 5. It is expected that numerous landholders will be impacted.

The expected commissioning date for this option is 2025/2026.

The expected expenditure profile for this option is obtained from the Transgrid's Standard Cost Estimating System. The estimates in the table below have an uncertainty of ± 25%.

Table 3: Project Expenditure Profile - Option B

	Total Project Base Cost ($m)	2022/23 ($m)	2023/24 ($m)	2024/25 ($m)	2025/26 ($m)
Estimated Cost – non-escalated	28.0	1.0	1.3	5.8	19.9

It is estimated that an amount up to $2.3 million is required to progress the project from DG1 to DG2 and this cost has been included in the expenditure provided in the Table 3. This is to cover activities such as site assessments, development of concept design, the commencement of project approvals and the early procurement of long lead-time items if required.

This project is expected to be completed in an estimated 43 months following the approval of DG1.

Option C — Build a new three circuit breaker (CB) 132 kV switching station on 132 kV Line 948 [NOSA N2746, OFS N2746 Rev 0]

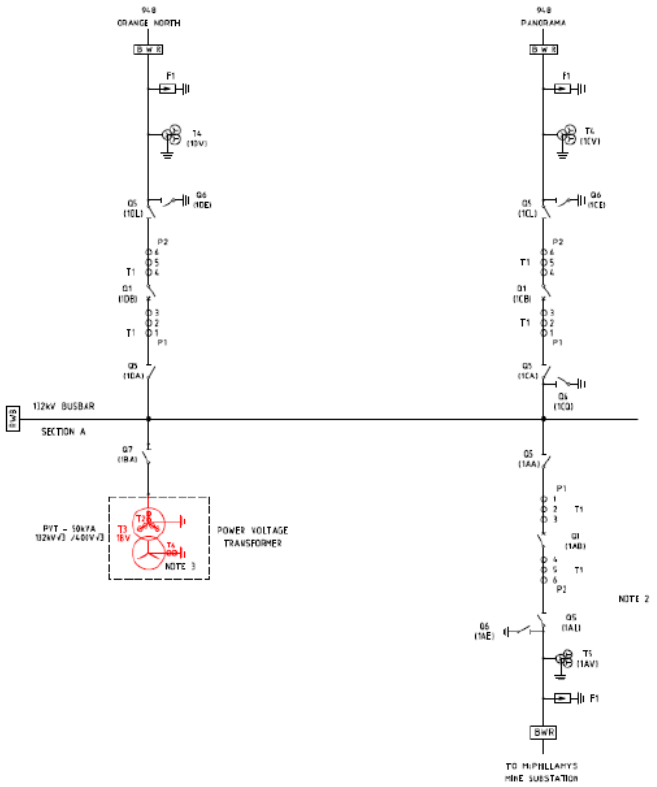
Under this option, the 132 kV line 948 will be cut into to establish a loop in/out arrangement and construction of a three circuit breaker switching station at a location approximately 18 km west of Transgrid's Panorama substation. The new switching station will be built on Transgrid owned land (Transgrid to procure the land) and will be owned by Transgrid as a regulated asset. The three circuit breaker arrangement will provide an acceptable level of reliability and security to the existing customers.

Figure 8 illustrates the single line diagram of the proposed works under option C. The proposed point of connection with Essential Energy will be the switch bay for the 132 kV feeder, at the new switching station. From this new switching station, a new 132 kV transmission will be required to be established by Essential Energy to connect the switching station to the mine site.

The high-level scope of the Option C is as below:

- Cut-in to and cut-out from existing 132 kV Feeder 948 between structures 60 and 62
- Establish a new 132 kV switching station consisting of:
  - 3 off 132 kV line switchbays
  - 1 off 132 kV busbar
  - 1 off 132 kV Power Voltage Transformer
  - Auxiliary Services Building
  - Diesel LVAC Generator
  - Ancillary systems

Figure 8: Single Line Diagram of the proposed switching station in Option C



The expected commissioning date for this option is 2025/2026.

The expected expenditure profile for this option is obtained from the Transgrid's Standard Cost Estimating System. The estimates in the table below have an uncertainty of ± 25%.

Table 4: Project Expenditure Profile - Option C

	Total Project Base Cost ($m)	2022/23 ($m)	2023/24 ($m)	2024/25 ($m)	2025/26 ($m)
Estimated Cost – non-escalated	15.8	0.6	4.4	10.6	0.2

It is estimated that an amount up to $2.3 million is required to progress the project from DG1 to DG2 and this cost has been included in the expenditure listed in Table 4. This is to cover activities such as site assessments, development of concept designs, the commencement of project approvals and the early procurement of long lead-time items if required.

This project is expected to be completed in an estimated 36 months following the approval of DG1.

Option D — Non-network Options

Non-network options may partially address the need by providing reactive support requirements particular for option A. Any reactive support arrangement would need to be separate to the Supply to Bathurst

Orange Project reactive support. Other options do not have reactive support requirements and network investment is needed to connect the load.

Potential non-network options may include but are not limited to the following, or may include a combination of:

- procurement of reactive power support from a BESS to be installed at a nearby site (Panorama or Orange North);
- procurement of demand management services within the area supplied by Panorama and Orange North during the times of peak demand and/or outage conditions to alleviate the network constraints; and
- Voluntary under voltage load shedding schemes associated with the industrial loads in the Central West area.

It is expected that investigation of potential non-network options will be undertaken during the RIT-T process.

3.3. Options considered and not progressed

The following options were considered but were not progressed.

Option	Reason for not progressing
Double circuiting the Line 948 from Orange North to approx. 33 km and build a 3 CB switching station	This option considered rebuilding the existing 132 kV Line 948 from Orange North substation towards Panorama for approx. 33 km and construct a switching station to supply a connection point to Essential Energy. Although this option is similar to Option B, line upgrade will be required for additional 8 km compared to Option B hence the associated cost will be much higher. Further due to urban/industrial development around Orange North Substation many more land/property holders will be affected. Therefore, this option is deemed to be commercially non-viable.
Non-network solution – Incremental support from the BOP BESS solution	Utilising the proposed BESS at Panorama to support the McPhillamys load up to 35 MVA (instead of 27 MVA) has been considered. The studies confirmed that reactive support from a single large plant would lead to risk of severe under voltages at the mine site and in the nearby network in case of an unplanned outage of the BESS. This would lead to severe reliability issues in the area hence this option is technically not feasible.

4. Evaluation

4.1. Commercial evaluation methodology

The economic assessment undertaken for this project includes three scenarios that reflect a central set of assumptions based on current information that is most likely to eventuate (central scenario), a set of assumptions that give rise to a lower bound for net benefits (lower bound scenario), and a set of assumptions that give rise to an upper bound on benefits (higher bound scenario).

Assumptions for each scenario are set out in the table below.

Table 5: Assumptions used in scenarios

Parameter	Central scenario	Lower bound scenario	Higher bound scenario
Discount rate	5.5%	7.5%	2.3%
Demand Growth	Medium (POE50)	Low (POE90)	High (POE10)
Capital cost	100%	125%	75%
Operating expenditure	100%	125%	75%
VCR[10]	AER Latest VCR (escalated) 100%	AER Latest VCR (escalated) 70%	AER Latest VCR (escalated) 130%
Scenario weighting	50%	25%	25%

Since the central scenario represents the most likely scenario to occur, it has been weighted at 50%. The other two scenarios reflect extreme combinations of assumptions designed to stress test the results. Accordingly, these scenarios are weighted at 25% each.

Parameters used in this commercial evaluation:

Parameter	Parameter Description	Value used for this evaluation
Discount year	Year that dollar values are discounted to	2022
Base year	The year that dollar value outputs are expressed in real terms	2022/23 dollars
Period of analysis	Number of years included in economic analysis with remaining capital value included as terminal value at the end of the analysis period.	25 years substations

The capex figures in this OER do not include any real cost escalation.

4.2. Commercial evaluation results

The commercial evaluation of the technically feasible options is set out in Table 6. Details appear in Appendix A.

[10] $36.47/kWh – 2021 VCR Annual Adjustment ppublished by AER in December 2021; adjusted based on the CPI of 3.01%

Table 6 - Commercial evaluation (PV, $ million)

Option	Capital Cost PV	OPEX Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Option A	16.4	4.2	1,440	326	2,196	1,351	2
Option B	23.1	5.8	1,251	274	1,914	1,172	3
Option C	13.7	3.3	1,443	329	2,199	1,353	1

4.3. Preferred option

As per Table 6, all three options considered in the evaluation provide positive NPV for all three scenarios. This is primarily due to the large risk cost associated with the expected unserved energy in the Base Case which will be eliminated via any of the Options A, B or C.

Amongst the three options, Option A and C carries highest weighted NPV, Option C being marginally ahead with a higher NPV. In addition to the highest NPV, Option C also provides a solution which can be utilised for future expansion or augmentation in the shared network. Therefore, Option C which provides the highest weighted NPV and needs the lowest capital cost will be selected as the preferred network option from the evaluation carried out and reported in this document.

The selected preferred option carries following benefits:

- Meets the requirements of the identified need with the lowest amount of augmentation works compared to the other two options.
- Lowest capital expenditure.
- Provides provision to future network expansion in terms of capacity and voltage.
- No additional reactive support is required to address the current need.

The scope of the preferred option is as below:

Option C — Build a new three circuit breaker (CB) 132 kV switching station on 132 kV Line 948

- Cut-in to and cut-out from existing 132 kV Feeder 948 between structures 60 and 62
- Establish a new 132 kV switching station consisting of:
  - 3 off 132 kV line switchbays
  - 1 off 132 kV busbar
  - 1 off 132 kV Power Voltage Transformer
  - Auxiliary Services Building
  - Diesel LVAC Generator
  - Ancillary systems

Capital and Operating Expenditure

The preferred option requires capital expenditure of $15.8 million. For the commercial evaluation an operating expenditure of 2% (of the Capital expenditure) has been assumed.

Regulatory Investment Test

As the estimated cost of the project is above the Regulatory Investment Test (RIT-T) threshold of $7 million, a RIT-T will be required.

5. Optimal Timing

The test for optimal timing of the preferred option has been undertaken. The approach taken is to identify the optimal commissioning year for the preferred option where net benefits (including avoided costs and safety disproportionality tests) of the preferred option exceeds the annualised costs of the option. The commencement year is determined based on the required project disbursement to meet the commissioning year based on the OFS.

The commencement year is determined based on the required project disbursement to the meet the commissioning year based on the OFS.

The results of optimal timing analysis is:

- Optimal commissioning year: 2025/26
- Commissioning year annual benefit: $1,905 million
- Annualised cost: 985k

Based on the optimal timing, the project is expected to commence in the 2023-2028 Regulatory Period.

6. Recommendation

Given there may be non-network options that will be required to be assessed, the final preferred option will be determined through the RIT-T process. This will be based on detailed network analysis, market modelling, technical and economic feasibility. However, based on the option evaluations in this report, the preferred network option is:

- Option C – Build a new three circuit breaker (CB) 132 kV switching station on 132 kV Line 948.

It is therefore recommended that the project be approved to proceed to a RIT-T assessment, with a view to the preferred option being implemented by 2025/26.

Based on the options listed in Section 3.2, it is expected that this project would incur a capital cost of approximately $15.8 million. Further, the preferred option requires $2.3 million of capital cost to progress the project to Decision Gate 2 (DG2).

Appendix A – Option Summaries

Table 7: Summary of the Option A

Project Description	**Supply to Panorama area**		
Option Description	**Option A - Build a new 66 kV line switchbay and two 132 kV Capacitor Banks at Panorama 132/66 kV Substation**		
Project Summary			
Option Rank	2	Investment Assessment Period	40
Asset Life	45	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	1,440	Annualised CAPEX ($m)	1.2
NPV @ Lower Bound Scenario (PV, $m)	326	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	2,196	ALARP	N/A
NPV Weighted (PV, $m)	1,351	Optimal Timing	2025/26
Cost			
Direct Capex ($m)	17.0	Network and Corporate Overheads ($m)	1.6
Total Capex ($m)	18.6	Cost Capex (PV,$m)	16.4
Terminal Value ($m)	8.4	Terminal Value (PV,$m)	2.3

Table 8: Summary of the Option B

Project Description	**Supply to Panorama area**		
Option Description	**Option B – Build a new 132 kV switch bay at Panorama 132/66 kV substation and double circuit the existing Line 948 from Panorama to near structure No. 60 - approx. 18km**		
Project Summary			
Option Rank	3	Investment Assessment Period	40
Asset Life	45	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	1,251	Annualised CAPEX ($m)	1.7
NPV @ Lower Bound Scenario (PV, $m)	274	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,914	ALARP	N/A
NPV Weighted (PV, $m)	1,172	Optimal Timing	2025/26
Cost			
Direct Capex ($m)	25.9	Network and Corporate Overheads ($m)	2.1
Total Capex ($m)	28.0	Cost Capex (PV,$m)	23.1
Terminal Value ($m)	13.3	Terminal Value (PV,$m)	3.7

Table 9: Summary of the Option C

Project Description	**Supply to Panorama area**		
Option Description	**Option C – Development of new 132 kV Switching Station and cut-in to Feeder 948**		
Project Summary			
Option Rank	1	Investment Assessment Period	40
Asset Life	45	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	1,443	Annualised CAPEX ($m)	1.0
NPV @ Lower Bound Scenario (PV, $m)	329	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	2,199	ALARP	N/A
NPV Weighted (PV, $m)	1,353	Optimal Timing	2025/26
Cost			
Direct Capex ($m)	14.8	Network and Corporate Overheads ($m)	1.0
Total Capex ($m)	15.8	Cost Capex (PV,$m)	13.7
Terminal Value ($m)	7.5	Terminal Value (PV,$m)	2.1