Options Evaluation Report (OER)

Maintain Voltage in Beryl area
OER- **000000001316** revision **7.0**

Ellipse project no(s):

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Project reason: Compliance - Regulatory obligation

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Approvals

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Change history

Revision	Date	Amendment
0	3/11/2016	Initial Issue
1	13/12/2016	Clarified risk cost breakdown
2	06/08/2021	Updated as per the latest information
3	6/10/2021	Houston Kemp comments addressed
4	12/11/2021	Cutler Merz's comments addressed
5	12/11/2021	Updated Unserved Energy Calculation
6	24/12/2022	Cutler Merz's comments addressed
7	13/10/2022	Economic benefits adjusted to latest demand forecasts.

Executive summary

The business case for this project has been updated to align with the Essential Energy forecast in the Transmission Annual Planning Report (TAPR) 2022. Essential Energy have provided an updated forecast which aligns more with actual growths experienced at Beryl which have increased beyond levels forecast for the 2021 TAPR[1].

Beryl is located in the Central-West Orana region of NSW. Load in the area supplied from Beryl BSP is forecast to steadily increase to106 MW summer peak in 2031/32 and 106 MW winter peak in 2031, as per the latest 10 year forecast.

Transgrid have identified under-voltage constraints and reactive margin shortfalls in the Beryl area for a contingent outage of 132 kV line 94B[2] from Wellington BPS to Beryl BSP, particularly when the renewable generation in the area is not dispatched.

The National Electricity Rules (NER) require Transgrid to operate the transmission network within defined voltage limits and to satisfy reactive margin requirements, both in normal operation and following any credible contingency event. These limits will not be met at Beryl 132/66 kV Substation/Bulk Supply Point for a contingent outage of the Wellington to Beryl 132 kV line, 94B[3].

Failure to resolve these constraints will result in unserved energy, due to the interruption of supply to loads in the area under N-1 contingency conditions, and the need to avoid voltage collapse in the local 132 kV network.

To address these issues and remain compliant with NER requirements, without causing unacceptable loss of supply to customers, it will be necessary to augment Transgrid’s transmission network in the Beryl area. If no action is taken, the amount of unserved energy for Beryl customers (calculated as pre-contingent load shedding including output of renewable generation in the area), is forecast to increase approximately eight-fold from 2023 to 2032. Unserved energy has increased in the latest revision of this document, as Essential Energy latest demand forecast[4] has also increased. The increase is caused by demand growth at mine sites in Beryl area and steady growth of residential loads.

The assessment of the options considered to address this compliance need are given in the Table 1. All options evaluated result in high weighted Net Present Value (NPV) outcomes by consequence of large potential unserved energy costs in the central and higher-bound scenarios.

Table 1 - Evaluated options

Option	Description	Direct capital cost ($m)	Network and corporate overheads ($m)	Total capital cost[5] ($m)	Weighted NPV (PV, $m)	Rank
Option A	Install a synchronous condenser of 30 MVA at Beryl (132 kV)	21.6	0.9	22.4	708	1

[1] The demand increase is caused by demand growth at mine sites in Beryl area and steady growth of residential loads.
[2] The latest 2021 TAPR Beryl winter and summer demand forecasts were considered in the calculations.
[3] The details are provided in Need section of this document.
[4] The latest demand forecast is 2022-2031 Essential Energy forecast.
[5] 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.

Option	Description	Direct capital cost ($m)	Network and corporate overheads ($m)	Total capital cost[5] ($m)	Weighted NPV (PV, $m)	Rank
Option B	Establish a new 330/132 kV substation supplied via a cut-in to Line 79, and a new 132 kV transmission line from the new substation to Beryl 132/66 kV Substation	52.8	4.4	57.2	639	4
Option C	Battery Storage (18 MW/36 MWh) at Beryl Substation (132 kV)	53.9	0.0	53.9	663	3
Option D	Duplication of the 132 kV Line 94B, Wellington to Beryl	76.8	3.2	80	623	5
Option E	Install a 132 kV STATCOM at Beryl 132/66 kV substation, with a capability range of +30 MVAr to -5 MVAr	21.2	0.9	22.1	690	2

Options considered but not progressed and not evaluated are detailed in section 3.2.

The preferred option is Option A, as it meets the requirements of the need, is technically and commercially feasible[6], and has the highest Net Present Value (NPV).

[6] Option A is higher in cost than Option E, but takes three years to build vs four years for Option E. This brings Option A to ranking 1, based on weighted NPV in economic analysis model.

1. Need/opportunity

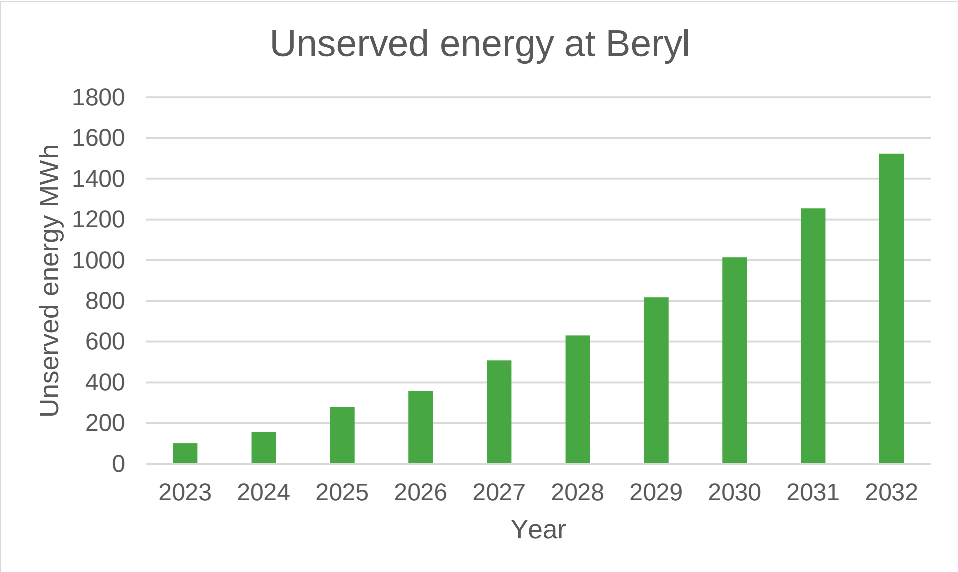
Beryl is located in the Central-West Orana region of NSW. Load in the area supplied from Beryl BSP is forecast to steadily increase to 106 MW summer peak in 2031/32 and 106 MW winter peak in winter peak in 2031, as per the latest 10 year forecast. Clause S5.1a.4 of the NER requires Transgrid to plan and design equipment for voltage control of its network to maintain voltage levels within 10 per cent of nominal voltage.[7] The power system must be operated in a satisfactory operating state, which requires voltages to be maintained within these levels, both in normal operation and following any credible contingency event[8].

Further, Clause S5.1.8 of the NER requires reactive power margin at any connection point to be not less than 1% of the maximum fault level (in MVA) at the connection point.

Power system studies have presently identified under-voltage constraints and reactive margin shortfalls in the Beryl area for a contingent outage of line 94B[9], particularly when the renewable generation in the area is not dispatched[10]. Under these conditions, interruptions of supply would be required to manage the emergence of voltage limits and reactive margin shortfalls being reached, and to avoid voltage collapse in the local 132 kV supply network.

Unserved energy in MWh and in $m in case of involuntary load shedding at Beryl is shown below (VCR value of $44,914/MWh was used in calculations):

Figure 1 – Unserved energy for base case scenario in MWh and $m



7 These levels are specified in Clause S5.1a.4.

8 These requirements are set out in Clauses 4.2.6, 4.2.4 and 4.2.2(b) of the NER. The requirement for secure operation of the power system in Clause 4.2.4 requires the power system to be in a satisfactory operating state following any credible contingency event, that is, to maintain voltage within 10 per cent of normal voltage following the first credible contingency event.

9 The latest 2022 TAPR Beryl winter and summer demand forecasts were considered in the calculations.

10 Beryl Area Constraints – Feasibility Study – March 2021, Transgrid

2. Related needs/opportunities

- 1942 - Increase capacity for generation in Beryl area

  The output of existing and future renewable generation in the Beryl area may be constrained due to the network capacity limitations in the area. This Need investigates the network development options to increase capacity for generation in the Beryl area which would result market and economic benefits. Need 1942 is currently required beyond the next regulatory period and hence has not progressed at present.

3. Options

3.1. Base case

A high-level assessment of the pre-investment risk is calculated based on following assumptions:

- The demand limit for Beryl 66 kV BSP is calculated by considering pre-contingent load shedding (i.e. The amount of pre-contingent load shedding required under system normal to avoid under voltage conditions following (N-1) contingency), to alleviate the under voltage conditions.
- The unserved energy in MWh for the next 10 years is calculated using Unserved Energy Cost Calculation Tool and considering output of Crudine Ridge Wind Farm. It indicated up to 26% of the summer peak load at Beryl system normal would need to be shed, to avoid voltage non-compliance in case of 94B outage.11

3.2. Options evaluated

Option A — New synchronous condenser of 30 MVA at Beryl (132 kV)

This option requires the installation of a new 30 MVA synchronous condenser, connected to the 132 kV busbar at Beryl 132/66 kV Substation.

The aim of this installation is to utilise the dynamic reactive power support from the synchronous condenser (up to 30 MVAr) to alleviate the under-voltage constraints identified.

Apart from addressing the identified Need, a synchronous condenser will also help to improve the system strength of the network in the area, which would be beneficial for the present and expected inverter-based renewable connections to the local network.

The works required for Option A are detailed in Option Feasibility Study (OFS) and include:

- installation of a new 132/11 kV transformer (assume 30 MVA);
- installation of a new 11 kV/415 V auxiliary transformer;
- installation of a new 30 MVA synchronous condenser and associated secondary systems;
- installation of a new control building with associated control and protection panels and LV switchgear;

[11] Values of potential load shedding at Beryl, in case of outage of 94B, are obtained through Power Factory analysis.

- extension of an existing switchyard bench;
- installation of a new 132 kV switchbay and secondary systems;
- installation of a new spill oil tank;
- upgrade of an auxiliary transformer; and
- modification of existing protection scheme.

The expected commissioning date for this option is 2026/27.

The estimates shown in the Table 2 have an uncertainty of ± 25% and exclude capitalised interest.

Table 2 – Option A expected expenditure

	Total Project Base Cost ($M)	FY2024/25 ($M)	FY2025/26 ($M)	FY2026/27 ($M)
Estimated P50 Cost non-escalated ($2021-22)	22.44	0.48	3.46	18.5

It is estimated that an amount up to $2 million (already included in total cost) is required to progress the project from Decision Gate 1 (DG1) to DG2. This is to cover activities such as site visits, development of concept design, and commencement of project approvals and early procurement of long lead-time items.

This project is expected to be completed in an estimated 36 months, following the approval of Decision Gate 1 (DG1).

Option B — New Beryl 330/132 kV substation

The scope of works for this option includes:

- Establish a new Beryl 330/132 kV Substation, with a single 330/132 kV transformer (indicative size – 375 MVA);
- Provide a 330 kV connection to the proposed Beryl 330/132 kV Substation, via a cut-in to line 79 in the area;
- Construct a new short 132 kV transmission line from new Beryl Substation to the existing Beryl 132/66 kV Substation. This will require a new 132 kV bay at the existing Beryl 132/66 kV Substation, to facilitate the line connection.

In addition to addressing the identified Need, this option will also improve the network capacity and system strength in the Beryl area, due to establishment of a new 330 kV supply point.

The works required for Option B are detailed in OFS-1316B Rev 0.

The expected commissioning date for this option is 2029/30.

The estimates in the Table 3 have an uncertainty of ± 25% and exclude capitalised interest.

Table 3 – Option B expected expenditure

	Total Project Cost ($M)	FY2025/26 ($M)	FY2026/27 ($M)	FY2027/28 ($M)	FY2028/29 $M)	FY2029/30 ($M)
Estimated P50 Cost non-escalated ($2021-22)	57.23	0.54	2.66	8.27	38.17	7.59

It is estimated that an amount up to $4 million (already included in total project cost) is required to progress the project from Decision Gate 1 (DG1) to DG2. This is to cover activities such as site visits, development of concept design, and commencement of project approvals and early procurement of long lead-time items.

This project is expected to be completed in an estimated 52 months, following the approval of DG1.

Option C — Battery Storage 18 MW/36 MWh at Beryl 132 kV Substation

This option is to install a new 18 MW/36 MWh Battery Energy Storage System (BESS) at the Beryl 132 kV BSP.

The BESS is capable of providing MW output and also MVAr output, which can provide dynamic reactive support during system disturbances. Considering the number of inverter-based generators in the vicinity of Beryl substation and relatively low system strength in the area, a BESS with grid forming inverter technology is likely to be required.

The scope of works for this option includes:

- extension of existing bus section;
- installation of a new 132 kV transformer and associated switchbay;
- installation of a new BESS secondary system building; and
- associated secondary system equipment.

The expected commissioning date for this option is 2029/30.

The estimates in the Table 4 have an uncertainty of ± 25% and exclude capitalised interest.

Table 4 – Option C expected expenditure

	Total Project Cost ($M)	FY2026/27 ($M)	FY2027/28 ($M)	FY2028/29 ($M)	FY2029/30 ($M)
Estimated P50 Cost non-escalated ($2021-22)	53.9	0.67	4.42	35.63	13.18

It is estimated that an amount up to $4M (already included in total project cost) is required to progress the project from Decision Gate (DG1) to DG2. This is to cover activities such as site visits, development of concept design, and commencement of project approvals and early procurement of long lead-time items.

This project is expected to be completed in an estimated 41 months, following the approval of DG1.

Option D — Duplication of 94B Wellington to Beryl 132 kV Line

The scope of works for this option includes:

- Establish a new 132 kV bay at Beryl 132/66 kV Substation and a new 132 kV bay at Wellington 330/132 kV Substation,
- Build a new 132 kV single circuit line, adjacent to line 94B, between Beryl and Wellington.

The existing line 94B is approximately 51 km long. Duplication of this line is expected to have significant environmental and community impact and significantly higher property and line easement acquisition risks, compared to other options.

The works required for Option D are detailed in OFS-1316D Rev 0.

The expected commissioning date for this option is 2031/32.

The estimates in the Table 5 have an uncertainty of ± 25% and exclude capitalised interest.

Table 5 – Option D expected expenditure

	Total Project Cost ($M)	2027/28 ($M)	2028/29 ($M)	2029/30 ($M)	2030/31 ($M)	2031/32 ($M)
Estimated P50 Cost non-escalated ($2021-22)	80	0.78	1.84	5.26	12.74	59.39

It is estimated that an amount up to $2 million (already included in total project cost) is required to progress the project from Decision Gate 1 (DG1) to DG2. This is to cover activities such as site visits, development of concept design, and commencement of project approvals and early procurement of long lead-time items.

This project is expected to be completed in an estimated 44 months, following the approval of DG1.

Option E — New 132 kV STATCOM (range +30 MVAr, -5 MVAr) at Beryl 132/66 kV Substation

This option involves installation of a STATCOM with a range of +30 MVAr to -5 MVAr, to provide dynamic reactive power support during system disturbances. Considering the number of inverter-based generators in the vicinity of Beryl substation and relatively low system strength in the area, a STATCOM with grid forming inverter technology will be required.

The scope of works for this option includes:

- extension of existing switchyard bench and existing bus section to accommodate new STATCOM switchbay;
- installation of a new 132 kV transformer switchbay and associated secondary systems; and
- installation of new 132/33 kV transformer and new spill oil tank and modification of existing protection schemes.

The expected commissioning date for this option is 2027/28.

The estimates in the Table 6 have an uncertainty of ± 25% and exclude capitalised interest.

Table 6 – Option E expected expenditure

	Total Project Cost ($M)	FY2024/25 ($M)	FY2025/26 ($M)	FY2026/27 ($M)	FY2027/28 ($M)
Estimated P50 Cost non-escalated ($2021-22)	22.08	0.35	2.75	18.68	0.3

It is estimated that an amount up to $2 million (already included in total project cost) is required to progress the project from decision gate 1 (DG1) to DG2. This is to cover activities such as site visits, development of concept design, and commencement of project approvals and early procurement of long lead-time items.

This project is expected to be completed in an estimated 41 months, following the approval of DG1.

Option F — Non-network options

No technically feasible or commercially viable non-network solutions have been identified. Notwithstanding, the project is expected to require a RIT-T which will allow non-network solution providers to submit proposals.

In conjunction with regulatory consultation, Transgrid will seek expressions of interest from non-network solution providers to address and/or defer the emergence of the need.

3.3. Options considered and not progressed

Options that were considered but not progressed, are outlined in the Table 7 below.

Table 7 – Options not progressed

Option	Reason for not progressing
Installation of additional Capacitor Banks	There are three capacitor banks (8 MVAr, 10 MVAr and 18 MVAr) already installed at Beryl 132/66 kV Substation. The addition of one or more capacitor banks at Beryl Substation would not address under voltage issues, on outage of line 94B and no renewable generation, so this option is not deemed technically 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.

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	AER Latest VCR[12] (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, this has been weighted at 50 per cent. The other two scenarios reflect extreme combinations of assumptions, designed to stress test the results. Accordingly, these scenarios are weighted at 25 per cent each.

Parameters used in this commercial evaluation are shown in the Table 9.

Table 9 – Parameters used in commercial evaluation

Parameter	Parameter Description	Value used for this evaluation
Discount year	Year that dollar values are discounted to	FY22
Base year	The year that dollar value outputs are expressed in real terms	FY22 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

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

[12] VCR used for these calculations is $44,914/MWh

4.2. Commercial evaluation results

The commercial evaluation of the technically feasible options is set out in the Table 10. Details appear in Appendix A. Large difference between NPV values for lower and higher scenario are due to a common load limit[13] set for all scenarios (central, high and low), while higher and lower forecast values for Beryl differ by approximately 15%.

Table 10 - 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	15,204	4,328	666	47	1,456	708	1
Option B	35,427	9,335	593	14	1,356	639	4
Option C	35,382	9,573	619	15	1,400	663	3
Option D	47,162	13,052	577	-3	1,343	623	5
Option E	14,757	3,922	645	46	1,421	690	2

4.3. Preferred option

The preferred option is Option A. Under this option the following works and installation new network elements is proposed at Beryl 132/66 kV Substation:

- Extend the 132 kV busbar and install a new 132 kV switchbay and associated secondary systems;
- Install a new 132/11 kV 30 MVA transformer;
- Install a new 1 MVA 11 kV/415 V auxiliary transformer;
- Procure and install a new 30 MVA synchronous condenser and associated secondary systems; and
- Provide a control building with associated control and protection equipment, and LV switchgear as required.

The preferred option has been selected because it meets the requirements of the need, is technically and commercially feasible[14] and has the highest NPV.

Option E, installation of STATCOM, has a total capital cost of $22.08 million vs preferred Option A, installation of synchronous condenser, which has a total capital cost of $22.44 million. However, construction of Option A takes three years and construction of Option E takes four years. If both options commence construction at the same time, the longer construction time leads to one more year of unserved energy for Option E vs. Option A, which places Option A in first place and the preferred option.

Capital and Operating Expenditure

The preferred option requires total capital expenditure of $22.44 million. This figure includes direct capital cost and network and overhead costs, listed in Table 1.

[13] Load limit is maximum value of load at Beryl BSP for which voltages and reactive margins are within their limits on outage of 94B and no renewable generation.
[14] All evaluated options meet the need and are technically feasible.

There is no capital or operating expenditure associated with the “Do Nothing” base case.

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 the meet the commissioning year based on the OFS.

The results of optimal timing analysis is:

- Optimal commissioning year: 2026/27
- Commissioning year annual benefit: $28,3 million
- Annualised cost: $1.4 million

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

6. Recommendation

Transgrid is required to operate the transmission network within defined voltage limits, under normal operation and during credible contingency events, as per NER rule S5.1a.4. Under voltage constraints and reactive margin shortfalls in the Beryl area, for a contingent outage of line 94B have been identified, particularly when the renewable generation in the area is not dispatched.

Failure to resolve these constraints in Beryl area will result in under voltage constraints and reactive margin shortfalls being reached, unserved energy due to the interruption of supply to loads in the area under N-1 contingency conditions, and the need to avoid voltage collapse in the local 132 kV network.

The recommendation is to progress with Option A - Install a synchronous condenser of 30 MVA at Beryl (132 kV) as it meets the requirements of the need, is technically and commercially feasible, and has the highest Net Present Value (NPV). This option requires $2 million of Capex to progress the project to Decision Gate 2 (DG2).

Appendix A – Option Summaries

Project Description	***Maintain voltage in Beryl area***		
Option Description	**Option A — Install a synchronous condenser of 30 MVA at Beryl (132 kV)**		
Project Summary			
Option Rank	1	Investment Assessment Period	25 years
Asset Life	40	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	666	Annualised CAPEX ($m)	1.4
NPV @ Lower Bound Scenario (PV, $m)	47	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,456	ALARP	N/A
NPV Weighted (PV, $m)	708	Optimal Timing	2026/27
Cost			
Direct Capex ($m)	21.6	Network and Corporate Overheads ($m)	0.9
Total Capex ($m)	22.4	Cost Capex (PV,$m)	15.2
Terminal Value ($m)	11.2	Terminal Value (PV,$m)	3.1

Project Description	***Maintain voltage in Beryl area***		
Option Description	**Option B— Establish a new 330/132 kV substation supplied via a cut-in to Line 79, and a new 132 kV**		
Project Summary			
Option Rank	4	Investment Assessment Period	25 years
Asset Life	40	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	593	Annualised CAPEX ($m)	3.6
NPV @ Lower Bound Scenario (PV, $m)	14	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,356	ALARP	N/A
NPV Weighted (PV, $m)	639	Optimal Timing	2029/30
Cost			
Direct Capex ($m)	52.8	Network and Corporate Overheads ($m)	4.4
Total Capex ($m)	57.2	Cost Capex (PV,$m)	35.4
Terminal Value ($m)	31.5	Terminal Value (PV,$m)	8.7

Transgrid

Project Description	*Maintain voltage in Beryl area*		
Option Description	**Option C - Battery Storage (18 MW/36 MWh) at Beryl Substation (132 kV)**		
Project Summary			
Option Rank	3	Investment Assessment Period	25 years
Asset Life	40	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	619	Annualised CAPEX ($m)	3.4
NPV @ Lower Bound Scenario (PV, $m)	15	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,400	ALARP	N/A
NPV Weighted (PV, $m)	663	Optimal Timing	2029/30
Cost			
Direct Capex ($m)	53.9	Network and Corporate Overheads ($m)	0.0
Total Capex ($m)	53.9	Cost Capex (PV,$m)	35.4
Terminal Value ($m)	28.3	Terminal Value (PV,$m)	7.8

Project Description	*Maintain voltage in Beryl area*		
Option Description	**Option D - Duplication of the 132 kV Line 94B, Wellington to Beryl**		
Project Summary			
Option Rank	5	Investment Assessment Period	25 years
Asset Life	40	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	577	Annualised CAPEX ($m)	5
NPV @ Lower Bound Scenario (PV, $m)	-3	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,343	ALARP	N/A
NPV Weighted (PV, $m)	623	Optimal Timing	2031/32
Cost			
Direct Capex ($m)	77	Network and Corporate Overheads ($m)	3
Total Capex ($m)	80	Cost Capex (PV,$m)	47.2
Terminal Value ($m)	44	Terminal Value (PV,$m)	12.2

Project Description	***Maintain voltage in Beryl area***		
Option Description	**Option E - Install a 132 kV STATCOM at Beryl 132/66 kV substation, with a capability range of +30 MVAr to -5 MVAr**		
Project Summary			
Option Rank	2	Investment Assessment Period	25 years
Asset Life	40	NPV Year	2022
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	645	Annualised CAPEX ($m)	1.4
NPV @ Lower Bound Scenario (PV, $m)	46	Network Safety Risk Reduction ($m)	N/A
NPV @ Higher Bound Scenario (PV, $m)	1,421	ALARP	N/A
NPV Weighted (PV, $m)	690	Optimal Timing	2027/28
Cost			
Direct Capex ($m)	21.2	Network and Corporate Overheads ($m)	0.9
Total Capex ($m)	22.1	Cost Capex (PV,$m)	14.8
Terminal Value ($m)	11.6	Terminal Value (PV,$m)	3.2