OPTIONS EVALUATION REPORT (OER)

FY24-28 VT Renewal Program

OER- N2348 revision 4.0

Ellipse project no(s):
TRIM file: [TRIM No]

Project reason: Capability - Asset Replacement for end of life condition
Project category: Prescribed - Asset Renewal Strategies

Approvals

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Date submitted for approval	12 November 2021	

Change history

Revision	Date	Amendment
0	02/09/2021	Initial revision
1	11/11/2021	Minor updates
2	12/11/2021	Minor formatting updates
3, 4	12/11/2021	Minor formatting updates

Executive summary

Voltage transformers (VTs) are high voltage equipment whose primary purpose to accurately transform main system voltage levels to the range that is useable by secondary systems equipment as per stipulated Australian Standards. This is essential for the control and protection of the high voltage network and revenue metering. The majority of VTs are either Magnetic VT (MVT) or Capacitive VT (CVT) construction types.

MVTs and CVTs approaching end of life present an increased risk of failure, causing unplanned network outages, with potential catastrophic failure resulting in safety and environmental hazards. 174 VT projects (448 units including 45 oil filled MVTs and 403 CVTs) have been identified as requiring consideration to assess the identified risk for implementation in the 2023 – 2028 regulatory period under this need. As such this is an economic benefits need.

The assessment of the options considered to address this identified need appears in Table 1. The result is that 97 (284 units) voltage transformer projects have been selected to be included in the program based on the option meeting following criteria:

- Meets the need,
- Is technically feasible,
- Has a positive net present value,
- The optimal project timing is earlier than the end of the 2023 – 2028 regulatory period.

The remaining 77 voltage transformer projects (164 units) evaluated do not meet the above criteria and are not included in the proposed renewal program under this need. The option evaluation summary for the recommended 97 voltage transformer replacement projects (284 units) is shown in Table 1.

Table 1 - Evaluated options ($ million)

Option	Description	Direct capital cost	Network and corporate overheads	Total capital cost[1]	Weighted NPV	Rank
Option A	Replace with conventional voltage transformer	11.97	2.95	14.92	34.61	1

It is recommended to proceed with implementing the replacement program comprising 97 voltage transformer projects (284 units) with a total program cost of $14.92 million. The detailed breakdown of option evaluation for each project is provided in Appendix B.

[1] 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.

1. Need/opportunity

Existing network VTs are comprised of either magnetic voltage transformer (MVT), capacitive voltage transformer (CVT) and used to transform high voltage to low voltage. MVTs are further classified as oil insulated, SF6 gas insulated or cast resin insulated. Out of these technologies oil-filled MVTs and CVTs possess risk of explosive failures and therefore has been assessed through application of the Network Asset Risk Assessment Methodology as follows:

- Voltage transformer health index scores are calculated based on condition data including age and condition monitoring data and type issues.
- Health index scores are mapped to an effective age
- Voltage transformers are assigned an individual probability of failure based on its individual effective age
- Consequences of a voltage transformer failure and the likelihood of the consequences occurring are calculated based on network criticality, public and worker safety risk exposure, environmental risk and financial risk for each asset.
- The consequence and probability of failure are combined to determine the annual economic risk cost for each voltage transformer for use in the evaluation for the renewal of voltage transformers in each bay.
- VTs are referred to as single phase assets. Each project comprise voltage transformers selected in this bay for the need, total project cost comprises of all VTs replacements in a bay (typically three phase or single phase).

There are 448 voltage transformers (comprised of 45 MVTs and 403 CVTs) nearing end of life by the end of the 2023-2028 regulatory period and have been included in this option evaluation report for consideration of replacement. The key economic benefits associated with addressing this need are summarised as:

- Reduction of risk valued as a direct impact to Transgrid and consumers including:
  - Impact of expected unserved energy;
  - Safety and environmental hazards associated with a catastrophic failure.

2. Related needs/opportunities

Assets considered within this VT renewal program (need N2348) have also been considered for renewal or removal under the following need:

- N2534 - Southern NSW fault level increase program –Wagga 330kV VTs
- 2145 - Southern NSW improve voltage control –Kemps Creek SVC bay

These needs have been reconciled to ensure no duplication within the final replacement programs.

3. Options

3.1 Base case

Under the ‘Base Case’ no renewal strategy is implemented for the assets evaluated under this need. This is a ‘run to fail’ scenario and will lead to an increase in the identified risks under this need, the eventual failure of the assets and the realisation of the expected consequences. This case shall only be considered as a last resort should no option be deemed viable through the NPV evaluation process.

3.2 Options evaluated

Option A — Replace with conventional VT [NOSA N2348, OFS N2348A]

This option considers the replacement of existing VTs with a new unit.

Of the 448 voltage transformers in this need all are evaluated under Option A. Option A fully addresses the identified need by installation of a new voltage transformer with very low probability of failure and associated risk cost. The replacement costs under Option A for each project within this program are included in Appendix B, with an expected duration of 1 year for each project.

Replacement work may include the following:

- High voltage and civil design work
- Secondary system design work
- Plant procurement and transportation
- Civil work (e.g.: footing replacement or modifications as required)
- Site work and commissioning

3.3 Options considered and not progressed

The following options were considered but not progressed:

Table 2- Other options considered

Option	Reason for not progressing
Non-conventional VTs	The trial for non-conventional VTs (e.g. fibre optic based measuring technologies) are underway under existing need 1578. The trial is demonstrating that the replacement costs with this technology is much higher than conventional VTs and therefore it is not economically feasible to include as part of this replacement program.
Increased maintenance or inspections	The condition issues have already been identified and cannot be rectified through increased maintenance or inspections, and therefore are not technically feasible to address the need.
Elimination of all associated risk	This can only be achieved by retiring the assets, which is not technically feasible due to the requirement to maintain the existing network reliability.
Non-network solutions	It is not technically feasible for non-network solutions to provide the functionality of the equipment under this need.

4. Evaluation

4.1 Commercial evaluation methodology

The economic assessment undertaken for this project includes three scenarios that reflect a central set 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 3 - Scenario assumptions

Parameter	Central scenario	Lower bound	Higher bound

		scenario	scenario
Discount rate	4.8%	7.37%	2.23%
Capital cost	100%	125%	75%
Operating expenditure benefit	Not applicable in this need		
Risk cost benefits	100%	75%	125%
Other Benefits	Not applicable in this need		
Scenario weighting	**50%**	**25%**	**25%**

Parameters used in this commercial evaluation:

Table 4 - Commercial evaluation parameters

Parameter	Parameter Description	Value used for this evaluation
Discount year	Year that dollar values are discounted to	2020/21
Base year	The year that dollar value outputs are expressed in real terms	2020/21 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
ALARP disproportionality	Multiplier of the environmental and safety related risk cost included in NPV analysis to demonstrate implementation of obligation to reduce to ALARP.	Refer to section 4.3 for details.

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

4.2 Commercial evaluation results

174 voltage transformer projects (448 units) have been evaluated for implementation in the 2023 – 2028 regulatory period under this need. The result is that 97 voltage transformer projects (284 units) have been selected to be included in the program. The commercial evaluation of the technically feasible options is set out in Table 5, showing 97 projects where the highest ranked option for each evaluated project:

- Meets the need,
- Is technically feasible,
- Has a positive net present value,
- Provides the highest net present value of each option evaluated,
- Optimal project timing is earlier than the end of the 2023 – 2028 regulatory period.

Table 5 - Commercial evaluation ($ million)

Option	Capital Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Option A	10.75	26.72	6.55	67.19	31.80	1

4.3 ALARP evaluation

TransGrid manages and mitigates bushfire and safety risk to ensure they are below risk tolerance levels or 'As Low As Reasonably Practicable' ('ALARP'), in accordance with the regulation obligations and TransGrid's business risk appetite. Under the Electricity Supply (Safety and Network Management) Regulation 2014 Section 5 'A network operator must take all reasonable steps to ensure that the design, construction, commissioning, operation and decommissioning of its network (or any part of its network) is safe.' TransGrid maintains an Electricity Network Safety Management System (ENSMS) to meet this obligation.[2]

In its Network Risk Assessment Methodology, under the ALARP test with the application of a gross disproportionate factor[3], the weighted benefits are expected to exceed the cost. TransGrid's analysis concludes that the costs are less than the weighted benefits from mitigating bushfire and safety risks. The proposed investment will enable TransGrid to continue to manage and operate this part of the network to a safety and risk mitigation level of ALARP.

Evaluation of the above options has been completed in accordance with As Low As Reasonably Practicable (ALARP) obligations. The Network Safety Risk Reduction is calculated as 6 x Bushfire Risk Reduction + 3 x other Environmental Risks + 3 or 6 x Safety Risk Reduction + 0.1 x Reliability Risk Reduction.

Results of the ALARP evaluation are set out in **Table 6**.

Table 6 - Reasonably practicable test ($ million)

Option	Network Safety Risk Reduction	Annualised Capex	Reasonably Practicable?[4]
A	0.61	0.42	Y (48 VT projects)

4.4 Preferred option

The list of the projects and options for each of the 174 VT replacement projects (448 units) evaluated are included in Appendix B This criteria results in 97 voltage transformer replacement projects (284 units) that are recommended to be progressed at a total program cost of $14.92 million under this need.

Replacement of a voltage transformer under the preferred option fully meets the need by achieving the risk reduction outlined in Section 3. The remaining 77 voltage transformer projects (164 units) evaluated do not meet this criteria and are not recommended to be replaced under this need.

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2 TransGrid's ENSMS follows the International Organization for Standardization's ISO31000 risk management framework which requires following hierarchy of hazard mitigation approach

3 The values of the disproportionality factors were determined through a review of practises and legal interpretations across multiple industries, with particular reference to the works of the UK Health and Safety Executive. The methodology used to determine the disproportionality factors in this document is in line with the principles and examples presented in the AER Replacement Planning Guidelines and is consistent with TransGrid's Revised Revenue Proposal 2023/24-2027/28.

4 Reasonably practicable is defined as whether the annualised CAPEX is less than the Network Safety Risk Reduction.

Capital and Operating Expenditure

Opex cost benefits associated avoided corrective expenditure has been allowed for in the business case NPV and optimal timing evaluation. There are no capex to opex trade-offs considered in this evaluation.

Regulatory Investment Test

The program and estimate allows for the appropriate regulatory approvals as 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 results of optimal timing analysis for each voltage transformer project within the program is included in Appendix B.

This OER recommends progressing only positive business cases which are optimally time before the end of the 2023-2028 regulatory period, hence all projects are evaluated for benefit in the final year of the period.

- Evaluation commissioning year: 2027/28
- Commissioning year annual benefit: $2.2 million
- Annualised cost: $0.80 million

6. Recommendation

It is recommended to proceed with implementing 97 voltage transformer replacement projects (284 units) at a total program cost of $14.92 million.

This program amount includes an allowance of $3.2 million to progress the project from Decision Gate 1 (DG1) to Decision Gate 2 (DG2).

The list of the 97 recommended VT replacement projects are included in Appendix C.

Appendix A - Option Summaries

Project Summary: N2348 Program - VTs OER Option A, Optimally Timed and NPV Positive			
Option Rank	*1*	Investment Assessment Period	*25*
Asset Life	*40*	NPV Year	2021
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $million)	*26.72*	Annualised CAPEX @ Central Benefit Scenario ($million)	*0.80*
NPV @ Lower Bound Scenario (PV, $million)	*6.55*	Network Safety Risk Reduction ($million)	*1.06*
NPV @ Higher Bound Scenario (PV, $million)	*67.19*	ALARP	*Program-See Appendix B*
NPV Weighted (PV, $million)	*31.80*	Optimal Timing	*Program-See Appendix B*
Cost			
Direct Capex ($million)	*11.97*	Network and Corporate Overheads ($million)	*2.95*
Total Capex ($million)	*14.92*	Cost Capex (PV,$ million)	*10.75*
Terminal Value ($million)	*5.22*	Terminal Value (PV,$ million)	*1.17*
Risk	Pre	Post	Benefit
Reliability (PV,$ million)	Reliability Risk (Pre) *15.98*	Reliability Risk (Post) *0.45*	Pre – Post *15.53*
Financial (PV,$ million)	Financial Risk (Pre) *1.70*	Financial Risk (Post) *0.05*	Pre – Post *1.65*
Operational/Compliance (PV,$ million)	Operational Risk (Pre) *0.00*	Operational Risk (Post) *0.00*	Pre – Post *0.00*
Safety (PV,$ million)	Safety Risk (Pre) *12.83*	Safety Risk (Post) *0.41*	Pre – Post *12.42*
Environmental (PV,$ million)	Environmental Risk (Pre) *4.26*	Environmental Risk (Post) *0.13*	Pre – Post *4.13*
Reputational ($ million)	Reputational Risk (Pre) *5.16*	Reputational Risk (Post) *0.16*	Pre – Post *5.00*
Total Risk (PV,$ million)	Total Risk (Pre) *39.93*	Total Risk (Post) *1.20*	Pre – Post *38.73*
OPEX Benefit (PV,$ million)			OPEX Benefit *0.00*
Other benefit (PV,$ million)			Incremental Net Benefit *0.00*
Total Benefit (PV,$ million)			Business Case Total Benefit *38.73*

Appendix B - VT Option Evaluation Summary

The table below list all the VT projects, which have been evaluated under this need, with their evaluation outcome and optimal timing for renewal.

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
CMSAVS1B	3	330	$ 168,000	No	2042/43	$ 9,456	$ 9,524	$ 64,748	No, not optimally timed
CMSAVS1C	3	330	$ 168,000	No	2023/24	$ 9,984	$ 9,524	$ 65,460	Yes
CMSBFD1AB	3	330	$ 168,000	No	2042/43	$ 9,391	$ 9,524	$ 65,099	No, not optimally timed
CMSDPT1L1	1	330	$ 136,000	No	2045/46	$ 5,649	$ 7,710	$ 21,729	No, not optimally timed
CMSDPT1L2	1	330	$ 136,000	No	2051/52	$ 5,649	$ 7,710	-$ 19,336	No, NPV negative
CMSDPT1M1	1	330	$ 136,000	No	2047/48	$ 5,649	$ 7,710	$ 4,128	No, not optimally timed
CMSDPT1M2	1	330	$ 136,000	No	2053/54	$ 5,649	$ 7,710	-$ 44,982	No, NPV negative
CMSDPT1N	3	330	$ 168,000	Yes	2023/24	$ 25,119	$ 9,524	$ 126,976	Yes
CMSDPT1P	3	330	$ 168,000	Yes	2023/24	$ 24,414	$ 9,524	$ 154,333	Yes
CMSDPT2J1	3	132	$ 140,000	Yes	2023/24	$ 23,544	$ 7,937	$ 156,013	Yes
CMSDPT2K	3	132	$ 140,000	Yes	2023/24	$ 26,028	$ 7,937	$ 164,533	Yes
CMSING1C1	3	330	$ 168,000	No	2023/24	$ 11,063	$ 9,524	$ 65,118	Yes
CMSING1D1	3	330	$ 168,000	No	2023/24	$ 10,763	$ 9,524	$ 98,073	Yes
CMSING4H	2	66	$ 121,000	No	2023/24	$ 9,164	$ 6,860	$ 62,457	No, redundant Bay
CMSKCR0B1	3	500	$ 204,000	Yes	2023/24	$ 27,510	$ 11,565	$ 96,584	Yes
CMSKCR0B4	3	500	$ 204,000	Yes	2023/24	$ 24,860	$ 11,565	$ 135,743	Yes
CMSKCR0C1	3	500	$ 204,000	Yes	2023/24	$ 24,860	$ 11,565	$ 97,773	Yes
CMSKCR0G1	3	500	$ 204,000	Yes	2023/24	$ 26,230	$ 11,565	$ 125,782	Yes
CMSKCR1A3	3	330	$ 168,000	Yes	2023/24	$ 29,970	$ 9,524	$ 157,677	Yes
CMSKCR1B4	3	330	$ 168,000	Yes	2023/24	$ 31,042	$ 9,524	$ 133,157	Yes
CMSKCR1C4	3	330	$ 168,000	Yes	2023/24	$ 25,131	$ 9,524	$ 205,112	Yes
CMSKCR1G1	3	132	$ 140,000	No	2042/43	$ -	$ 7,937	$ 83,975	No, not optimally timed
CMSKCR1P1	3	330	$ 168,000	Yes	2023/24	$ 26,521	$ 9,524	$ 128,471	No, due to being part of other need
CMSKCR1P2	1	330	$ 136,000	No	2053/54	$ 5,828	$ 7,710	-$ 30,746	No,NPV negative

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
CMSKVS1E	1	330	$ 136,000	No	2047/48	$ 2,560	$ 7,710	$ 5,220	No, not optimally timed
CMSKVS1F	1	330	$ 136,000	No	2049/50	$ 2,842	$ 7,710	-$ 10,836	No,NPV negative
CMSLP11E1	3	330	$ 168,000	No	2023/24	$ 7,307	$ 9,524	$ 88,667	Yes
CMSLP11H1	3	330	$ 168,000	No	2043/44	$ 6,719	$ 9,524	$ 46,988	No, not optimally timed
CMSLP12A	3	132	$ 140,000	No	2041/42	$ 7,820	$ 7,937	$ 65,501	No, not optimally timed
CMSLP12B	3	132	$ 140,000	No	2041/42	$ 7,302	$ 7,937	$ 76,532	No, not optimally timed
CMSSYN1D2	3	330	$ 168,000	Yes	2023/24	$ 21,142	$ 9,524	$ 153,740	Yes
CMSSYN1H1	3	330	$ 168,000	No	2023/24	$ 11,819	$ 9,524	$ 87,927	Yes
CMSSYS1J1	3	330	$ 168,000	Yes	2023/24	$ 27,422	$ 9,524	$ 148,230	Yes
CMSSYS1N1	3	330	$ 168,000	Yes	2023/24	$ 35,486	$ 9,524	$ 712,725	Yes
CMSSYW1C2	3	330	$ 168,000	Yes	2023/24	$ 19,275	$ 9,524	$ 128,579	Yes
CMSSYW2P2	1	132	$ 122,000	No	2023/24	$ 7,801	$ 6,916	$ 8,717	No
CMSVYD1D1	3	330	$ 168,000	No	2039/40	$ 5,719	$ 9,524	$ 185,244	No, not optimally timed
CMSVYD1E1	3	330	$ 168,000	No	2042/43	$ 5,685	$ 9,524	$ 57,823	No, not optimally timed
COSCW22H	3	132	$ 140,000	No	2040/41	$ 5,537	$ 7,937	$ 111,777	No, not optimally timed
COSCW22K	3	132	$ 140,000	No	2042/43	$ 6,610	$ 7,937	$ 56,276	No, not optimally timed
COSFB22G	3	132	$ 140,000	No	2040/41	$ 7,354	$ 7,937	$ 74,860	No, not optimally timed
COSMPP1D	3	132	$ 140,000	No	2039/40	$ 7,670	$ 7,937	$ 150,420	No, not optimally timed
COSMPP1E	3	132	$ 140,000	No	2040/41	$ 7,594	$ 7,937	$ 92,650	No, not optimally timed
COSMPP1F	3	132	$ 140,000	No	2040/41	$ 7,559	$ 7,937	$ 75,306	No, not optimally timed
COSMPP1H	3	132	$ 140,000	No	2040/41	$ 7,766	$ 7,937	$ 92,655	No, not optimally timed
COSMTP1B1	3	330	$ 168,000	Yes	2023/24	$ 19,427	$ 9,524	$ 162,159	Yes
COSMTP1F1	3	330	$ 168,000	No	2023/24	$ 17,470	$ 9,524	$ 344,274	Yes
COSMTP1G1	3	330	$ 168,000	Yes	2023/24	$ 19,792	$ 9,524	$ 126,807	Yes
COSMTP2F	2	132	$ 131,000	No	2023/24	$ 11,168	$ 7,426	$ 85,442	No
COSPKS1D	3	132	$ 140,000	No	2041/42	$ 4,232	$ 7,937	$ 99,069	No, not optimally timed
COSPKS1F	3	132	$ 140,000	No	2046/47	$ 3,641	$ 7,937	$ 15,386	No, not optimally timed
COSPKS1G	3	132	$ 140,000	No	2040/41	$ 4,217	$ 7,937	$ 108,242	No, not optimally timed
COSPKS2M	3	66	$ 130,000	No	2042/43	$ 4,324	$ 7,370	$ 51,217	No, not optimally timed

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
COSPMA2C1	3	132	$ 140,000	No	2023/24	$ 10,003	$ 7,937	$ 81,087	Yes
COSPMA2D1	3	132	$ 140,000	No	2023/24	$ 10,204	$ 7,937	$ 114,157	Yes
COSPMA4N	3	66	$ 130,000	No	2039/40	$ 4,284	$ 7,370	$ 157,325	No, not optimally timed
COSWL11D1	3	330	$ 168,000	No	2023/24	$ 13,417	$ 9,524	$ 97,542	Yes
COSWL12E	3	132	$ 140,000	Yes	2023/24	$ 15,897	$ 7,937	$ 71,268	Yes
COSWL12K	3	132	$ 140,000	Yes	2023/24	$ 17,089	$ 7,937	$ 124,323	Yes
COSWL12R	3	132	$ 140,000	No	2023/24	$ 13,250	$ 7,937	$ 121,748	Yes
COSWL12T	3	132	$ 140,000	Yes	2023/24	$ 17,061	$ 7,937	$ 108,805	Yes
COSWW11B1	3	330	$ 168,000	No	2023/24	$ 12,019	$ 9,524	$ 120,451	Yes
COSWW11B4	1	330	$ 136,000	No	2049/50	$ 4,386	$ 7,710	-$ 9,988	No,NPV negative
COSWW11BA	1	330	$ 136,000	No	2049/50	$ 5,439	$ 7,710	-$ 6,559	No,NPV negative
COSWW11BB	1	330	$ 136,000	No	2051/52	$ 5,459	$ 7,710	-$ 17,562	No,NPV negative
COSWW11C1	4	330	$ 184,000	No	2023/24	$ 12,740	$ 10,431	$ 141,797	Yes
COSWW11C4	2	330	$ 152,000	No	2023/24	$ 10,029	$ 8,617	$ 76,480	No
COSWW11D41	1	330	$ 136,000	No	2048/49	$ 5,712	$ 7,710	-$ 3,559	No,NPV negative
COSWW11E1	1	330	$ 136,000	No	2023/24	$ 5,991	$ 7,710	$ 26,614	Yes
COSWW11E4	1	330	$ 136,000	No	2045/46	$ 5,805	$ 7,710	$ 17,317	No, not optimally timed
NNSBAY0A2	3	500	$ 204,000	No	2042/43	$ 9,285	$ 11,565	$ 95,920	No, not optimally timed
NNSBAY0B2	3	500	$ 204,000	No	2046/47	$ 9,285	$ 11,565	$ 17,504	No, not optimally timed
NNSBAY1AC1	3	330	$ 168,000	No	2023/24	$ 14,234	$ 9,524	$ 92,791	Yes
NNSBAY1AD1	3	330	$ 168,000	No	2023/24	$ 13,749	$ 9,524	$ 119,552	Yes
NNSBAY1AE1	2	330	$ 152,000	No	2023/24	$ 9,165	$ 8,617	$ 9,265	No
NNSER00B3	3	500	$ 204,000	No	2023/24	$ 15,314	$ 11,565	$ 70,409	Yes
NNSER01AC1	3	330	$ 168,000	Yes	2023/24	$ 22,249	$ 9,524	$ 143,707	Yes
NNSER01AE1	3	330	$ 168,000	Yes	2023/24	$ 21,875	$ 9,524	$ 249,150	Yes
NNSKS22H	3	132	$ 140,000	No	2023/24	$ 9,911	$ 7,937	$ 138,071	Yes
NNSKS24G1	1	66	$ 112,000	No	2053/54	$ 5,535	$ 6,349	-$ 34,465	No,NPV negative
NNSKS24G2	1	66	$ 112,000	No	2049/50	$ 6,326	$ 6,349	-$ 6,075	No, NPV negative
NNSLD11AE1	3	330	$ 168,000	No	2023/24	$ 10,227	$ 9,524	$ 70,913	Yes

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
NNSLD11AG1	3	330	$ 168,000	No	2043/44	$ 9,095	$ 9,524	$ 55,232	No, not optimally timed
NNSLD11AK1	3	330	$ 168,000	No	2042/43	$ 8,146	$ 9,524	$ 72,896	No, not optimally timed
NNSLD11GB	3	330	$ 168,000	No	2023/24	$ 10,532	$ 9,524	$ 94,310	Yes
NNSLD11MB	2	330	$ 152,000	No	2043/44	$ 7,049	$ 8,617	$ 53,393	No, not optimally timed
NNSMN11A1	3	330	$ 168,000	No	2023/24	$ 10,023	$ 9,524	$ 130,872	Yes
NNSNEW2V	3	132	$ 140,000	Yes	2023/24	$ 21,978	$ 7,937	$ 693,941	Yes
NNSPMQ2B2	1	132	$ 122,000	No	2050/51	$ 5,529	$ 6,916	-$ 8,809	No, NPV negative
NNSPMQ2E	3	132	$ 140,000	No	2023/24	$ 10,604	$ 7,937	$ 115,101	Yes
NNSPMQ2J	3	132	$ 140,000	No	2023/24	$ 15,167	$ 7,937	$ 89,920	Yes
NNSTGH2E	3	132	$ 140,000	No	2023/24	$ 10,848	$ 7,937	$ 118,508	Yes
NNSTGH2F	3	132	$ 140,000	No	2040/41	$ 6,464	$ 7,937	$ 100,265	No, not optimally timed
NNSTOM1D	3	330	$ 168,000	No	2042/43	$ 9,113	$ 9,524	$ 76,883	No, not optimally timed
NNSTOM1G1	3	330	$ 168,000	Yes	2023/24	$ 19,896	$ 9,524	$ 76,389	Yes
NNSTOM1H	3	330	$ 168,000	Yes	2023/24	$ 15,660	$ 9,524	$ 82,053	Yes
NNSTRE2H	3	132	$ 140,000	Yes	2023/24	$ 22,680	$ 7,937	$ 208,442	Yes
NNSTRE4K	3	66	$ 130,000	Yes	2023/24	$ 26,649	$ 7,370	$ 185,756	Yes
NTSAR12M1	3	132	$ 140,000	Yes	2023/24	$ 31,859	$ 7,937	$ 308,261	Yes
NTSCOF2E	3	132	$ 140,000	Yes	2023/24	$ 18,261	$ 7,937	$ 77,907	Yes
NTSCOF2G	3	132	$ 140,000	No	2023/24	$ 12,786	$ 7,937	$ 103,257	Yes
NTSGN22A2	3	132	$ 140,000	Yes	2023/24	$ 21,661	$ 7,937	$ 795,944	Yes
NTSGN22B2	3	132	$ 140,000	Yes	2023/24	$ 27,542	$ 7,937	$ 920,963	No, due to being part of other need
NTSGN22E	3	132	$ 140,000	Yes	2023/24	$ 9,510	$ 7,937	$ 131,662	Yes
NTSGN22H	3	132	$ 140,000	Yes	2023/24	$ 9,784	$ 7,937	$ 102,087	Yes
NTSGN24M	3	66	$ 130,000	Yes	2023/24	$ 9,498	$ 7,370	$ 224,201	Yes
NTSINV2C1	3	132	$ 140,000	Yes	2023/24	$ 11,341	$ 7,937	$ 204,392	Yes
NTSINV2G1	3	132	$ 140,000	Yes	2023/24	$ 12,213	$ 7,937	$ 104,776	Yes
NTSINV4J	3	66	$ 130,000	Yes	2023/24	$ 10,955	$ 7,370	$ 164,292	Yes
NTSLSM1A2	3	330	$ 168,000	No	2023/24	$ 10,721	$ 9,524	$ 93,596	Yes
NTSLSM1B2	3	330	$ 168,000	No	2041/42	$ 9,168	$ 9,524	$ 95,465	No

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
NTSLSM2C	3	132	$ 140,000	No	2023/24	$ 9,606	$ 7,937	$ 122,904	Yes
NTSLSM2E	3	132	$ 140,000	No	2023/24	$ 13,346	$ 7,937	$ 98,005	Yes
NTSLSM2F	3	132	$ 140,000	No	2023/24	$ 13,549	$ 7,937	$ 137,052	Yes
NTSLSM2K	3	132	$ 140,000	No	2023/24	$ 10,447	$ 7,937	$ 56,727	Yes
NTSLSM2L	3	132	$ 140,000	No	2023/24	$ 11,636	$ 7,937	$ 88,134	Yes
SWSALB2F	3	132	$ 140,000	Yes	2023/24	$ 11,150	$ 7,937	$ 112,263	Yes
SWSALB2K	3	132	$ 140,000	Yes	2023/24	$ 16,963	$ 7,937	$ 183,721	No, part of other need
SWSANM2E	3	132	$ 140,000	Yes	2023/24	$ 10,679	$ 7,937	$ 95,924	Yes
SWSANM2G	3	132	$ 140,000	Yes	2023/24	$ 10,487	$ 7,937	$ 606,948	Yes
SWSANM2J	3	132	$ 140,000	Yes	2023/24	$ 14,650	$ 7,937	$ 1,258,296	Yes
SWSBKH7A	1	22	$ 130,000	No	2053/54	$ 7,091	$ 7,370	-$ 19,819	No, NPV negative
SWSBKH7B	1	22	$ 130,000	No	2023/24	$ 7,955	$ 7,370	-$ 7,050	No, due to being part of other need
SWSBKH7F	1	22	$ 130,000	No	2051/52	$ 4,980	$ 7,370	-$ 15,462	No,NPV negative
SWSBKH7K	1	22	$ 130,000	No	2045/46	$ 5,312	$ 7,370	$ 19,640	No, not optimally timed
SWSBKH7L	1	22	$ 130,000	Yes	2023/24	$ 49,986	$ 7,370	$ 3,018,819	No, due to being part of other need
SWSBKH7M	1	22	$ 130,000	No	2051/52	$ 4,553	$ 7,370	-$ 15,862	No,NPV negative
SWSBKH7V	1	22	$ 130,000	No	2046/47	$ 4,281	$ 7,370	$ 9,238	No, not optimally timed
SWSBKH7W	1	22	$ 130,000	No	2053/54	$ 4,597	$ 7,370	-$ 31,840	No,NPV negative
SWSBRG3G2	3	220	$ 168,000	No	2042/43	$ 5,190	$ 9,524	$ 84,320	No, not optimally timed
SWSDN22E	3	132	$ 140,000	No	2023/24	$ 8,713	$ 7,937	$ 77,766	Yes
SWSDNT1G1	3	330	$ 168,000	No	2023/24	$ 12,572	$ 9,524	$ 88,472	Yes
SWSDNT2A	3	132	$ 140,000	No	2023/24	$ 10,380	$ 7,937	$ 62,768	Yes
SWSDNT2B	3	132	$ 140,000	No	2023/24	$ 10,580	$ 7,937	$ 74,781	Yes
SWSDNT2D	3	132	$ 140,000	No	2023/24	$ 11,650	$ 7,937	$ 913,436	Yes
SWSDNT2E2	3	132	$ 140,000	No	2023/24	$ 13,575	$ 7,937	$ 157,435	Yes
SWSDNT2F	3	132	$ 140,000	No	2023/24	$ 13,731	$ 7,937	$ 139,502	Yes
SWSDNT2L	3	132	$ 140,000	No	2023/24	$ 13,474	$ 7,937	$ 92,961	Yes
SWSFNY2A	3	66	$ 130,000	Yes	2023/24	$ 15,931	$ 7,370	$ 8,163,099	No, due to being part of other need
SWSFNY2F	3	66	$ 130,000	No	2039/40	$ 5,745	$ 7,370	$ 163,103	No, not optimally timed

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
SWSFNY2G2	3	66	$ 130,000	No	2023/24	$ 10,409	$ 7,370	$ 176,496	Yes
SWSGRF2H	3	132	$ 140,000	Yes	2023/24	$ 12,711	$ 7,937	$ 113,261	Yes
SWSJDA1D1	3	330	$ 168,000	No	2040/41	$ 8,088	$ 9,524	$ 109,458	No, not optimally timed
SWSJDA1E1	3	330	$ 168,000	No	2042/43	$ 6,321	$ 9,524	$ 80,880	No, not optimally timed
SWSJDA2F	3	132	$ 140,000	No	2040/41	$ 7,548	$ 7,937	$ 108,081	No, not optimally timed
SWSJDA2H	3	132	$ 140,000	No	2042/43	$ 6,038	$ 7,937	$ 52,972	No, not optimally timed
SWSMUR1EN	1	330	$ 136,000	No	2023/24	$ 11,538	$ 7,710	$ 15,774	Yes
SWSMUR1ES	1	330	$ 136,000	No	2023/24	$ 11,552	$ 7,710	$ 6,144	Yes
SWSMUR1WN	1	330	$ 136,000	No	2029/30	$ 11,360	$ 7,710	-$ 23,906	No,NPV negative
SWSMUR1WS	1	330	$ 136,000	No	2023/24	$ 11,360	$ 7,710	$ 228	Yes
SWSMUR8A3	1	11	$ 130,000	No	2045/46	$ 460	$ 7,370	$ 14,701	No, not optimally timed
SWSUT11F1	3	330	$ 168,000	No	2023/24	$ 12,593	$ 9,524	$ 74,790	Yes
SWSUT11J1	3	330	$ 168,000	No	2023/24	$ 12,990	$ 9,524	$ 94,732	Yes
SWSUT11M1	1	330	$ 136,000	No	2053/54	$ 3,937	$ 7,710	-$ 26,393	No,NPV negative
SWSUT11P	1	330	$ 136,000	No	2053/54	$ 4,236	$ 7,710	-$ 54,221	No,NPV negative
SWSUT11Q	1	330	$ 136,000	No	2049/50	$ 4,339	$ 7,710	-$ 8,187	No,NPV negative
SWSUT11V1	3	330	$ 168,000	No	2023/24	$ 16,441	$ 9,524	$ 93,133	Yes
SWSUT11X1	3	330	$ 168,000	No	2023/24	$ 12,771	$ 9,524	$ 99,517	Yes
SWSWG11E1	3	330	$ 168,000	Yes	2023/24	$ 16,785	$ 9,524	$ 155,049	No, due to being part of other need
SWSWG11L1	3	330	$ 168,000	No	2023/24	$ 10,968	$ 9,524	$ 309,406	Yes
SWSWG12H2	3	132	$ 140,000	Yes	2023/24	$ 17,867	$ 7,937	$ 935,182	Yes
SWSWG12J	3	132	$ 140,000	Yes	2023/24	$ 22,084	$ 7,937	$ 210,557	Yes
SWSWG12K	3	132	$ 140,000	Yes	2023/24	$ 22,144	$ 7,937	$ 126,919	Yes
SWSWG12Q	3	132	$ 140,000	Yes	2023/24	$ 21,162	$ 7,937	$ 206,464	Yes
SWSWG12U	3	132	$ 140,000	Yes	2023/24	$ 19,114	$ 7,937	$ 107,651	Yes
SWSYA22D	3	132	$ 140,000	No	2039/40	$ 7,686	$ 7,937	$ 112,657	No, not optimally timed
SYSCA11C2	3	330	$ 168,000	Yes	2023/24	$ 29,771	$ 9,524	$ 150,736	Yes
SYSCA11J1	1	330	$ 136,000	No	2029/30	$ 7,778	$ 7,710	-$ 24,677	No,NPV negative
SYSCA11J3	1	330	$ 136,000	No	2029/30	$ 7,778	$ 7,710	-$ 22,150	No,NPV negative

Bay	Asset Count	Voltage KV	Capex	ALARP	Optimal Timing	Total Benefits	Annualised Capex	NPV Weighted	Included in program
SYSCA11M1	3	330	$ 168,000	Yes	2023/24	$ 21,632	$ 9,524	$ 167,575	Yes
SYSMRN2G	3	132	$ 140,000	No	2042/43	$ 4,952	$ 7,937	$ 60,050	No, not optimally timed
SYSMRN2J	3	132	$ 140,000	No	2041/42	$ 4,819	$ 7,937	$ 80,982	No, not optimally timed
SYSMRU2D	3	132	$ 140,000	No	2023/24	$ 8,303	$ 7,937	$ 99,756	Yes
SYSMRU2F	3	132	$ 140,000	No	2023/24	$ 8,845	$ 7,937	$ 124,257	Yes
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Appendix C - VT Replacement Program

The table below has list of all VTs that are included in renewal program under this need. They are all NPV positive and optimally timed for replacement in 2023-28 regulatory period.

Bay	Bay Description	Equipment Number	Capex	NPV (Weighted)	ALARP	Optimal Timing
CMSAVS1C	10 DAPTO 330KV FEEDER	VT-A05947/5 VT -A05947/3 VT-A05947/4	$ 168,000	$ 65,460	No	2023/24
CMSDPT1N	10 AVON 330KV FEEDER BAY	VT-ETA4328 VT -EC00015044 VT-ETA4327	$ 168,000	$ 126,976	Yes	2023/24
CMSDPT1P	18 KANGAROO VALLEY 330KV FEEDER BAY	VT-EC00010750 VT -ETA4323 VT-EC00010751	$ 168,000	$ 154,333	Yes	2023/24
CMSDPT2J1	980 BELLAMBI CREEK 132KV FEEDER	VT-EC00002937 VT -EC00002935 VT-EC00002936	$ 140,000	$ 156,013	Yes	2023/24
CMSDPT2K	981 BELLAMBI CREEK 132KV FEEDER	VT-EC00005382 VT -EC00005380 VT-EC00005381	$ 140,000	$ 164,533	Yes	2023/24
CMSING1C1	78 SYDNEY SOUTH 330KV FEEDER BAY	VT-EC00004527 VT -EC00004526 VT-EC00004528	$ 168,000	$ 65,118	No	2023/24
CMSING1D1	77 WALLERAWANG 330KV FEEDER BAY	VT-EC00004520 VT -EC00004521 VT-EC00004522	$ 168,000	$ 98,073	No	2023/24
CMSKCR0B1	5A1 ERARING 500KV FEEDER BAY	VT-EC00002241 VT -EC00002247 VT-EC00008713	$ 204,000	$ 96,584	Yes	2023/24
CMSKCR0B4	NO2 TRANSFORMER 500/330/33KV TRANSF BAY	VT-EC00006405 VT -EC00007466 VT-EC00007462	$ 204,000	$ 135,743	Yes	2023/24
CMSKCR0C1	NO3 TRANSFORMER 500/330/33KV TRANSF BAY	VT-EC00015034 VT -EC00015043 VT-EC00015040	$ 204,000	$ 97,773	Yes	2023/24
CMSKCR0G1	5A2 ERARING 500KV FEEDER BAY	VT-EC00002246 VT -EC00008715 VT-EC00002240	$ 204,000	$ 125,782	Yes	2023/24
CMSKCR1A3	37 MACARTHUR 330KV FEEDER BAY	VT-ETA7397 VT -EC00010759 VT-EC00010757	$ 168,000	$ 157,677	Yes	2023/24
CMSKCR1B4	13 SYDNEY SOUTH 330KV FEEDER BAY	VT-ETA7396 VT -EC00010762 VT-EC00010764	$ 168,000	$ 133,157	Yes	2023/24
CMSKCR1C4	14 SYDNEY NORTH 330KV FEEDER BAY	VT-EC00015011 VT -EC00010760 VT-EC00015012	$ 168,000	$ 205,112	Yes	2023/24
CMSLP11E1	12 SYDNEY SOUTH 330KV FEEDER BAY	VT-EC00006075 VT -EC00006101 VT-EC00006099	$ 168,000	$ 88,667	No	2023/24
CMSSYN1D2	NO4 TRANSFORMER 330/132/11KV TX BAY	VT-EC00004482 VT -EC00004481 VT-EC00004483	$ 168,000	$ 153,740	Yes	2023/24
CMSSYN1H1	22 VALES POINT 330KV FEEDER BAY	VT-ETA2236 VT -EC00006083 VT-ETA2336	$ 168,000	$ 87,927	No	2023/24
CMSSYS1J1	13 KEMPS CREEK 330KV FEEDER BAY	VT-EC00002412 VT -EC00002411 VT-EC00002410	$ 168,000	$ 148,230	Yes	2023/24
CMSSYS1N1	12 LIVERPOOL 330KV FEEDER BAY	VT-EC00002312 VT -EC00002311 VT-EC00002310	$ 168,000	$ 712,725	Yes	2023/24
CMSSYW1C2	NO3 TRANSFORMER 330/132/11KV TRANSF BAY	VT-EC00021123 VT -EC00019823 VT-EC00019776	$ 168,000	$ 128,579	Yes	2023/24
COSMTP1B1	330KV 72 WELLINGTON FEEDER BAY	VT-EC00006111 VT -EC00006113 VT-EC00006114	$ 168,000	$ 162,159	Yes	2023/24
COSMTP1F1	330KV 70 WALLERAWANG FEEDER BAY	VT-EC00006094 VT -EC00006089 VT-EC00006088	$ 168,000	$ 344,274	No	2023/24
COSMTP1G1	330KV 71 WALLERAWANG SS 330KV FEEDER BAY	VT-EC00006092 VT -EC00006116 VT-EC00006117	$ 168,000	$ 126,807	Yes	2023/24
COSPMA2C1	94X WALLERAWANG 132KV FEEDER BAY	VT-EC00006814 VT -EC00006816 VT-EC00006815	$ 140,000	$ 81,087	No	2023/24

Bay	Bay Description	Equipment Number	Capex	NPV (Weighted)	ALARP	Optimal Timing
COSPMA2D1	948 ORANGE 132KV FEEDER BAY	VT-EC00006817 VT -EC00006819 VT-EC00006818	$ 140,000	$ 114,157	No	2023/24
COSWL11D1	79 WOLLAR 330KV FEEDER BAY	VT-EC00004542 VT -EC00004543 VT-EC00004541	$ 168,000	$ 97,542	No	2023/24
COSWL12E	94B BERYL 132KV FEEDER BAY	VT-EC00002999 VT -EC00003001 VT-EC00003000	$ 140,000	$ 71,268	Yes	2023/24
COSWL12K	94K PARKES 132KV FEEDER BAY	VT-EC00003004 VT -EC00003002 VT-EC00003003	$ 140,000	$ 124,323	Yes	2023/24
COSWL12R	945 MOLONG TEE WEL'TON TWN 132KV FDR BAY	VT-EC00004333 VT -EC00004334 VT-EC00004335	$ 140,000	$ 121,748	No	2023/24
COSWL12T	947 ORANGE NORTH TEE B'DONG 132 FDR BAY	VT-EC00003010 VT -EC00003008 VT-EC00003009	$ 140,000	$ 108,805	Yes	2023/24
COSWW11B1	70 MT PIPER 500 - 330KV FEEDER BAY	VT-EC00006123 VT -EC00017677 VT-EC00017678	$ 168,000	$ 120,451	No	2023/24
COSWW11C1	71 MT PIPER 500 - 330KV FEEDER BAY	VT-EC00006112 VT -EC00006104 VT-EC00006074	$ 184,000	$ 141,797	No	2023/24
COSWW11E1	77 INGLEBURN 330KV FEEDER BAY	VT-EC00017675	$ 136,000	$ 26,614	No	2023/24
NNSBAY1AC1	34 LIDDELL 330KV FEEDER BAY	VT-EC00004540 VT -EC00004539 VT-EC00004538	$ 168,000	$ 92,791	No	2023/24
NNSBAY1AD1	33 LIDDELL 330KV FEEDER BAY	VT-EC00004536 VT -EC00004535 VT-EC00007457	$ 168,000	$ 119,552	No	2023/24
NNSER00B3	NO2 TIE TRANSFORMER 500KV BAY	VT-EC00006403 VT -EC00006404 VT-EC00006402	$ 204,000	$ 70,409	No	2023/24
NNSER01AC1	93 NEWCASTLE 330KV FEEDER BAY	VT-EC00012304 VT -EC00012303 VT-EC00015036	$ 168,000	$ 143,707	Yes	2023/24
NNSER01AE1	24 VALES POINT 330KV FEEDER BAY	VT-EC00012297 VT -EC00012301 VT-EC00012299	$ 168,000	$ 249,150	Yes	2023/24
NNSKS22H	9W2 RALEIGH 132KV FEEDER	VT-EC00019799 VT -EC00004516 VT-EC00004514	$ 140,000	$ 138,071	No	2023/24
NNSLD11AE1	33 BAYSWATER 330KV FEEDER BAY	VT-EC00007477 VT -EC00007476 VT-EC00007478	$ 168,000	$ 70,913	No	2023/24
NNSLD11GB	330KV GENERATOR BUSBAR	VT-TG005113 VT -TG005112 VT-EC00007480	$ 168,000	$ 94,310	No	2023/24
NNSMN11A1	2M TUGGERAH 330KV FDR BAY	VT-ETA6781 VT -EC00012306 VT-EC00012305	$ 168,000	$ 130,872	No	2023/24
NNSNEW2V	9NA BERESFIELD 132KV FEEDER	VT-EC00004332 VT -EC00006385 VT-EC00004330	$ 140,000	$ 693,941	Yes	2023/24
NNSPMQ2E	96G KEMPSEY 132KV FEEDER	VT-EC00004407 VT -EC00004405 VT-EC00004406	$ 140,000	$ 115,101	No	2023/24
NNSPMQ2J	964 TAREE 132KV FEEDER	VT-EC00009142 VT -EC00009144 VT-EC00009143	$ 140,000	$ 89,920	No	2023/24
NNSTGH2E	958 GOSFORD 132KV FEEDER	VT-EC00009237 VT -EC00009235 VT-EC00009236	$ 140,000	$ 118,508	No	2023/24
NNSTOM1G1	94 NEWCASTLE 330KV FEEDER BAY	VT-EC00004547 VT -EC00004549 VT-EC00004548	$ 168,000	$ 76,389	Yes	2023/24
NNSTOM1H	95 NEWCASTLE 330KV FEEDER	VT-EC00015380 VT -EC00015381 VT-EC00015379	$ 168,000	$ 82,053	Yes	2023/24
NNSTRE2H	963 TOMAGO 330 TEE HAWKS NEST 132KV FDR	VT-A09096/3 VT -A09096/1 VT-A09096/2	$ 140,000	$ 208,442	Yes	2023/24
NNSTRE4K	863 WHITBREAD ST ZONE SS 66KV FEEDER	VT-EC00013280 VT -EC00013278 VT-EC00013269	$ 130,000	$ 185,756	Yes	2023/24
NTSAR12M1	965 KEMPSEY 132KV FEEDER BAY	VT-EC00004445 VT -EC00008681 VT-EC00008680	$ 140,000	$ 308,261	Yes	2023/24
NTSCOF2E	96H KOOLKHAN 132KV FEEDER	VT-T00122/1 VT -T00121/1 VT-T00121/2	$ 140,000	$ 77,907	Yes	2023/24
NTSCOF2G	96C/1 ARMIDALE TEE 132KV FEEDER	VT-EC00004504 VT -EC00004502 VT-EC00004503	$ 140,000	$ 103,257	No	2023/24

Bay	Bay Description	Equipment Number	Capex	NPV (Weighted)	ALARP	Optimal Timing
NTSGN22A2	NO1 TRANSFORMER 132KV TRANSFORMER BAY	VT-EC00006948 VT -EC00006953 VT-EC00006949	$ 140,000	$ 795,944	Yes	2023/24
NTSGN22E	969 TAMWORTH 132KV FEEDER	VT-EC00004313 VT -EC00004311 VT-EC00004312	$ 140,000	$ 131,662	Yes	2023/24
NTSGN22H	9U3 BOGGABRI EAST - 132KV FEEDER	VT-EC00004315 VT -EC00004316 VT-EC00004314	$ 140,000	$ 102,087	Yes	2023/24
NTSGN24M	877 KEEPIT PS 66KV FEEDER	VT-ETA5685 VT -ETA5686	$ 130,000	$ 224,201	Yes	2023/24
NTSINV2C1	9U2 MOREE 132KV FEEDER BAY	VT-EC00004471 VT -EC00004470 VT-EC00004469	$ 140,000	$ 204,392	Yes	2023/24
NTSINV2G1	96N ARMIDALE 330 - 132KV FEEDER BAY	VT-EC00004484 VT -EC00004486 VT-EC00004485	$ 140,000	$ 104,776	Yes	2023/24
NTSINV4J	733 GLEN INNES 66 - 66KV FEEDER	VT-EC00007506 VT -EC00007508 VT-EC00007507	$ 130,000	$ 164,292	Yes	2023/24
NTSLSM1A2	NO1 TRANSFORMER 330KV TRANSFORMER BAY	VT-EC00023699 VT -EC00023697 VT-ETA2382	$ 168,000	$ 93,596	No	2023/24
NTSLSM2C	967 KOOLKHAN 132KV FEEDER	VT-EC00023705 VT -EC00023703 VT-TG003274	$ 140,000	$ 122,904	No	2023/24
NTSLSM2E	9W1 LISMORE 132KV FEEDER	VT-EC00023708 VT -EC00023706 VT-EC00023707	$ 140,000	$ 98,005	No	2023/24
NTSLSM2F	9U9 LISMORE 132KV FEEDER	VT-EC00023711 VT -EC00023709 VT-EC00023710	$ 140,000	$ 137,052	No	2023/24
NTSLSM2K	9U8 LISMORE 132KV FEEDER	VT-EC00023714 VT -EC00023712 VT-TG003914	$ 140,000	$ 56,727	No	2023/24
NTSLSM2L	96L TENTERFIELD 132KV FEEDER	VT-EC00023717 VT -ETA2384 VT-EC00023716	$ 140,000	$ 88,134	No	2023/24
SWSALB2F	99B JINDERA 132KV FEEDER	VT-EC00010446 VT -EC00010448 VT-EC00010447	$ 140,000	$ 112,263	Yes	2023/24
SWSANM2E	99H JINDERA 132KV FEEDER	VT-EC00003269 VT -EC00003271 VT-EC00003270	$ 140,000	$ 95,924	Yes	2023/24
SWSANM2G	996 WAGGA 330 TEE MORVEN 132KV FEEDER	VT-EC00003274 VT -EC00003272 VT-EC00003273	$ 140,000	$ 606,948	Yes	2023/24
SWSANM2J	99Z ALBURY 132KV FEEDER	VT-EC00003286 VT -EC00003287 VT-EC00003288	$ 140,000	$ 1,258,296	Yes	2023/24
SWSDN22E	99L COLEAMBALLY 132 - 132KV FEEDER	VT-EC00006238 VT -EC00006234 VT-EC00006237	$ 140,000	$ 77,766	No	2023/24
SWSDNT1G1	63 WAGGA 330 - 330KV FEEDER BAY	VT-EC00006096 VT -EC00006124 VT-EC00006100	$ 168,000	$ 88,472	No	2023/24
SWSDNT2A	NO1 TRANSFORMER 132KV A BUS CB BAY	VT-EC00006235 VT -EC00006248 VT-EC00006243	$ 140,000	$ 62,768	No	2023/24
SWSDNT2B	NO2 TRANSFORMER 132KV B BUS CB BAY	VT-EC00006144 VT -EC00006251 VT-EC00006141	$ 140,000	$ 74,781	No	2023/24
SWSDNT2D	99T/1 COLEAMBALLY 132KV FEEDER	VT-EC00006200 VT -EC00006147 VT-EC00006146	$ 140,000	$ 913,436	No	2023/24
SWSDNT2E2	99R HAY FEEDER BAY	VT-EC00004412 VT -EC00004413 VT-EC00004411	$ 140,000	$ 157,435	No	2023/24
SWSDNT2F	99K GRIFFITH 132KV FEEDER	VT-EC00004404 VT -EC00004402 VT-EC00004403	$ 140,000	$ 139,502	No	2023/24
SWSDNT2L	99D YANCO 132KV FEEDER	VT-EC00004477 VT -EC00004475 VT-EC00004476	$ 140,000	$ 92,961	No	2023/24
SWSFNY2G2	84A JERILDERIE 66KV FEEDER BAY	VT-EC00013313 VT -EC00013308 VT-EC00013295	$ 130,000	$ 176,496	No	2023/24
SWSGRF2H	99K DARLINGTON PT 132KV FEEDER	VT-EC00004458 VT -EC00004457 VT-EC00004459	$ 140,000	$ 113,261	Yes	2023/24
SWSMUR1EN	330kV B Bus - No.1 Section Bus	VT-ETA8455	$ 136,000	$ 15,774	No	2023/24
SWSMUR1ES	330kV B Bus - No.2 Section Bus	VT-ETA8456	$ 136,000	$ 6,144	No	2023/24

Bay	Bay Description	Equipment Number	Capex	NPV (Weighted)	ALARP	Optimal Timing
SWSMUR1WS	330kV A Bus - No.2 Section Bus	VT-ETA8458	$ 136,000	$ 228	No	2023/24
SWSUT11F1	01 Canberra 330kV Feeder Bay	VT-ETA8211 VT -ETA8212 VT-ETA8213	$ 168,000	$ 74,790	No	2023/24
SWSUT11J1	65 Murray 330kV Feeder Bay	VT-ETA8214 VT -ETA8215 VT-ETA8216	$ 168,000	$ 94,732	No	2023/24
SWSUT11V1	2 Yass 330 - 330kV Feeder Bay	VT-ETA8226 VT -ETA8227 VT-ETA8228	$ 168,000	$ 93,133	No	2023/24
SWSUT11X1	64 Lower Tumut 330kV Feeder Bay	VT-ETA8220 VT -ETA8221 VT-ETA8222	$ 168,000	$ 99,517	No	2023/24
SWSWG11L1	63 DARLINGTON POINT 330KV FEEDER BAY	VT-EC00015384 VT -EC00015382 VT-EC00015383	$ 168,000	$ 309,406	No	2023/24
SWSWG12H2	9R5 WAGGA NORTH 132KV FEEDER BAY	VT-A07115/6 VT -A07115/5 VT-EC00019804	$ 140,000	$ 935,182	Yes	2023/24
SWSWG12J	99X WAGGA 132KV SS - 132KV FEEDER BAY	VT-A07115/3 VT -A07115/1 VT-A07115/2	$ 140,000	$ 210,557	Yes	2023/24
SWSWG12K	993 GADARA 132KV FEEDER	VT-A07114/9 VT -A07114/7 VT-A07113/5	$ 140,000	$ 126,919	Yes	2023/24
SWSWG12Q	99W WAGGA 132KV SS - 132KV FEEDER BAY	VT-A07114/3 VT -A07114/1 VT-A07114/2	$ 140,000	$ 206,464	Yes	2023/24
SWSWG12U	996 A.N.M. 132KV FEEDER BAY	VT-A07113/3 VT -EC00004451 VT-A07113/2	$ 140,000	$ 107,651	Yes	2023/24
SYSCA11C2	NO3 TRANSF 330/132/16KV TRANSF BAY	VT-A06573/6 VT -A06573/4 VT-A06573/5	$ 168,000	$ 150,736	Yes	2023/24
SYSCA11M1	6 CAPITAL WIND FARM 330KV FEEDER BAY	VT-5834/3 VT -EC00007481 VT-EC00016701	$ 168,000	$ 167,575	Yes	2023/24
SYSMRU2D	99M YASS 330KV SS - 132KV FEEDER	VT-EC00004501 VT -EC00004500 VT-EC00004499	$ 140,000	$ 99,756	No	2023/24
SYSMRU2F	991 WAGGA NORTH - 132kV FEEDER	VT-EC00004480 VT -EC00004478 VT-EC00004479	$ 140,000	$ 124,257	No	2023/24
Total	**97**		**$ 14,924,000**			