OPTIONS EVALUATION REPORT (OER)

FY24-28 Circuit Breaker Renewal Program

OER- N2345 revision 3.0

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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Change history

Revision	Date	Amendment
00	8/9/21	Original issue
01	8/9/21	Minor wording updates.
02	22/10/21	Updated risks and formatting
03	10/11/21	Minor update of option evaluation discussion

Executive summary

Circuit breakers (CBs) are essential for controlling and protecting the high voltage network by switching both load currents and fault currents. Circuit breakers approaching end of life present an increased risk of failure, causing unplanned network outages, catastrophic failure causing safety and environmental hazards. 184 CBs across TransGrid's network have been identified as requiring consideration for renewal in the 2023 – 2028 regulatory period based on their effective age. These assets have been assessed through TransGrid's risk assessment methodology and evaluated for renewal which is expected to meet an economic benefits need.

Circuit breakers considered for renewal are typically live head circuit breaker (LHCB) construction. Dead tank circuit breakers (DTCBs) incorporate current transformers (CTs). Where CTs are installed in the same network location as a LHCB being evaluated for replacement, both LHCB replacement (Option A) and DTCB (Option B) are evaluated.

The assessment of the options considered to address this identified need appears in Table 1. The result is that 130 of the 184 circuit breaker projects were selected to be included in the program based on the option meeting the following criteria:

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

The remaining 54 circuit breakers out of the 184 CBs evaluated do not meet the above criteria and are not recommended to be replaced under this need.

The option evaluation summary for the recommended 130 circuit breaker replacements is shown in Table 1, comprises of:

- 69 LHCBs where Option A is the highest ranked and only option; and
- 61 DTCBs where Option B is the highest ranked option.

Table 1 - Evaluated options – Summary ($ million)

Option	Description	Direct capital cost	Network and corporate overheads	Total capital cost[1]	Weighted NPV	Rank
Projects where Option A - LHCB is the highest ranked option – 69 Circuit Breakers						
Option A	Replace with conventional LHCB	17.11	3.10	20.21	306.43	1
Option B	Replace with conventional DTCB	No DTCB can be evaluated as there are no associated CTs considered for asset renewal.				
Projects where Option B - DTCB is the highest ranked option – 61 Circuit breakers						
Option A	Replace with conventional LHCB	11.40	2.29	13.69	108.13	2
Option B	Replace with conventional DTCB	18.88	3.24	22.12	209.01	1

Option C, non-conventional CB replacement solutions, was not evaluated for all replacements. All non-conventional solutions included a higher cost under Option C than Option A or Option B, without providing any additional economic benefits to offset the increased cost. However an additional allowance of $0.40 million is recommended to implement a small number of SF_6[2] alternative insulation circuit breakers to support the long term strategic benefit of reducing reliance on SF_6. Further details are in section 3.

It is recommended to proceed with the replacement program comprising 130 circuit breakers with a program cost of $42.72 million, consisting of:

- $20.21 million LHCB replacements
- $22.12 million DTCB replacements, and
- $0.40 million for non-conventional CB replacement solutions.

The detailed option evaluation outcomes 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.

[2] Sulfur hexafluoride (SF_6) is an extremely potent and persistent greenhouse gas that is used in high voltage electrical equipment as an electrical insulator and arc suppressant.

1. Need/opportunity

Circuit breakers are essential for the control and protection of the high voltage network. TransGrid has a range of circuit breakers operating from 11kV up to 500kV, with various ages and technologies. The circuit breakers are located across the network with a wide range of duty cycles, environmental exposure and loading. The impact of each circuit breaker failure varies with where it is located in the network. Failure of a circuit breaker to operate will result in an uncleared fault that must be cleared with a larger outage (via a circuit breaker failure back up protection operation) and possible loss of customer load and economic loss from unserved energy.

The existing in-service circuit breaker population has been assessed through the application of the Network Asset Risk Assessment Methodology as follows:

- Circuit breaker health index scores are calculated based on condition data including defect rates, defect cost, age, operations count, reactive switching duty, condition monitoring data and design reliability.
- Health index scores are mapped to an effective age
- Circuit breakers are assigned an individual probability of failure based on its individual effective age
- Consequences of a circuit breaker 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 circuit breaker for use in the evaluation for the renewal of each circuit breaker.

There are 184 circuit breakers identified as 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. Each asset is evaluated individually to determine if either of the options should be implemented in the 2023 - 2028 Regulatory Period.

This is an economic benefits need with the following identified benefits:

- 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.
- Avoided operating expenditure related to corrective maintenance.

2. Related needs/opportunities

Assets considered within this circuit breaker program (need N2345) include circuit breakers and, where relevant, the associated current transformers (CTs); these assets are also considered for renewal under need N2347 - FY24-28 CT Renewal Program.

These needs have been reconciled to ensure no duplication in project scope or risk and benefit calculations within the final replacement programs.

3. Options

3.1 Base case

Under the ‘Base Case’ scenario, there is no consideration for replacement of 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 materialisation of the expected consequences. This case shall only be considered a last resort should no option be deemed viable through the economic evaluation process.

Increased operating and maintenance costs are included as an opex cost against the assets under this scenario. The increased cost is modelled based on historical breakdown (corrective) repair costs and represents an operating cost benefit when mitigated through an asset replacement.

3.2 Options evaluated

Option A — Replace with conventional LHCB [NOSA N2345, OFS N2345A]

This option considers the replacement of an existing live head circuit breaker (LHCB) with a new conventional (typical SF_6 insulated) LHCB. In this option, associated CTs are excluded from the replacement project.

Where a dead tank circuit breaker (DTCB) is currently installed, a LHCB installation with additional separate live head CTs is not evaluated due to the benefits of retaining a DTCB installation. These benefits include a lower total installation cost, lower asset failure risk compared to separate LHCB and CTs.

Of the 184 circuit breakers in this need 182 are evaluated under Option A. The 2 CBs not evaluated under Option A are existing DTCBs.

Option A fully addresses the identified need by installation of a new condition circuit breaker 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 individual replacement 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

Option B — Replace with conventional DTCB [NOSA N2345, OFS N2345B]

This option considers replacing an existing LHCB and the associated CTs, or replacing the existing DTCB with a new conventional (typical SF_6 insulated) DTCB. Where a DTCB is not technically feasible (e.g. at 500kV), there are no associated CTs in the bay, or the associated CTs have substantial remaining life, the DTCB option is not evaluated. Of the 184 circuit breakers in this need 69 are evaluated under Option B there are 115 CBs not evaluated under Option B due to one of these reasons.

Option B fully addresses the identified need by installation of a new circuit breaker with very low probability of failure and associated risk cost. The use of a DTCB removes the separate CT assets from the network therefore removing the associated failure risk and maintenance costs.

The replacement costs under Option B for each project within this program are included in Appendix B, with an expected duration of 1 year for each individual replacement 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

Option C — Replace with non-conventional solution [NOSA N2345, OFS N2345C]

This option was included to consider LHCB and DTCB replacements using the following non-conventional solutions:

1. Retrofit of the existing CB with new modern design poles and mechanism
2. SF_6 alternative insulation with reduced global warming potential[3], including use of vacuum interrupter technology.

1. Retrofit of existing CB with new poles and mechanisms

This option considered engaging the original equipment manufacturer of the currently installed make/model CB for new modern design poles and mechanisms compatible with the existing footing, structure, and cable entry locations.

The detailed analysis of this aspect of Option C was not progressed in the OER due to the higher cost estimate as compared to Option A and Option B, without providing any additional economic or strategic benefits to offset the increased cost.

2. SF6 alternative technologies

Investigation into non-conventional circuit breaker replacement options identified circuit breakers with design alternatives to minimised or remove SF_6 as an insulation and arc quenching medium. Due to the significant CO_2 equivalent value of SF_6, equipment manufacturers are expanding their SF_6 alternative product options.

Based on federal and state government emissions target policies, there is community expectation for ongoing reductions in carbon emissions and the potential for explicit future emissions restrictions or a carbon tax to be imposed on TransGrid or equipment importers. In response to these external drivers, it is recommended to procure and install a small number of the mature equipment designs utilising non-SF_6 technologies as part of this circuit breaker replacement program to take the initial steps as part of a longer term strategy of reducing TransGrid's reliance on SF_6.

These initial replacements will provide the following benefits:

- This will improve the organisational experience with reliability, operability and maintainability
- Enable TransGrid to prepare for a potential future carbon tax environment which may need to be responded to more urgently
- Inform cost estimates to support future option analysis to improve long-term asset lifecycle cost performance of assets and provide the optimal outcome for consumers.
- Trial and evaluate available technologies, suppliers and designs to achieve better outcomes for future larger scale implementation
- Reduce implementation costs for subsequent assets
- Provide supplier feedback on design and implementation issues

[3] SF_6 is a reportable gas under the National Greenhouse and Energy Reporting scheme.

The following additional costs are proposed to be included in this CB replacement program based on the comparison with the existing standard evaluated SF_6 replacement options:

Table 2 – Project cost for SF6 alternative technology ($ thousand)

Items	Typical SF6 cost (Option A or B)	Proposed Non-SF6 Cost (Option C)	Proposed increase
2 x 66kV LHCBs	370	499	129
2 x 66kV DTCB	328	399	67
2 x 132kV LHCBs	422	623	201

It is noted that the above costs included initial development costs which would not be required for subsequent replacements.

Therefore an additional $0.40 million (0.9% of the program) is included in this OER for this purpose. The specific assets to be used as part of this initial program will be determined during the design scoping phase.

3.3 Options considered and not progressed

The following options were considered but not progressed:

Table 3 - Options not progressed

Option	Reason for not progressing
D – refurbishment and overhaul	The refurbishment/overhaul scope of work involves renewing all deteriorating components of a circuit breaker that is typically >30 years old. In TransGrid's experience, the cost of such overhauls is a substantial portion of replacement works considered under other options while presenting the following additional risks: > Outdated and suboptimal component design may be retained in the overhaul. > Parts and technician support is expected to be limited or unavailable. > Continuous current and fault level ratings may not be suitable. > Local overhaul is expected to result in higher defect and failure rates to factory manufacturing processes. > With consideration the potential for life extension is expected to be no more than 10 years. The option has not been progressed as it is considered not economically feasible.
Increased maintenance or inspections	The condition issues have already been identified and cannot be rectified through increased maintenance or inspections, and therefore is 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 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 4 - Scenario assumptions

Parameter	Central scenario	Lower bound scenario	Higher bound scenario
Discount rate	4.8%	7.37%	2.23%
Capital cost	100%	125%	75%
Operating expenditure benefit	100%	75%	125%
Risk costs benefit	100%	75%	125%
Other benefits	Not applicable in this assessment		
Scenario weighting	**50%**	**25%**	**25%**

Parameters used in this commercial evaluation are shown in Table 5

Table 5 - 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
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
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

The commercial evaluation of the technically feasible options is set out in Table 6, showing 130 circuit breaker 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 among the options evaluated,
- Optimal project timing is earlier than the end of the 2023 – 2028 regulatory period.

54 circuit breakers evaluated did not meet the criteria under any option and are not included in Table 6.

Table 6 shows 130 circuit breakers that met the criteria, 69 circuit breakers had associated CTs which did not meet the criteria set out under Option B for consideration of replacement with a DTCB and so can only be replaced under Option A with a LHCB; these provide an NPV of $306.43 million. The remaining 61 CBs that met the criteria were evaluated under both Option A and Option B, with Option B providing the highest NPV of $209.01 million. In total, the replacement of 69 CBs with LHCBs and 61 CBs with DTCBs results in a total weighted NPV of $515.44 million.

Further details appear in Appendix A.

Table 6 - Commercial evaluation ($ million)

Option	Capital Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Projects where Option A (LHCB) is the highest ranked option - 69 Circuit Breakers						
Option A	14.55	266.39	115.42	577.51	306.43	1
Option B	No DTCB is able to be evaluated as there are no associated CTs considered for asset renewal.					
Projects where Option B (DTCB) is the highest ranked option - 61 Circuit Breakers						
Option A	9.86	93.54	37.98	207.45	108.13	2
Option B	15.93	181.55	75.99	396.97	209.01	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.[4]

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

In its Network Risk Assessment Methodology, under the ALARP test with the application of a gross disproportionate factor[5], 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 x Safety Risk Reduction + 0.1 x Reliability Risk Reduction.

The results of the ALARP evaluation are set out in Table 7. This table shows results for 86 of the 130 circuit breakers identified in this OER which are justifiable under the ALARP evaluation.

Table 7 - Reasonably practicable test ($ million)

Option	Network Safety Risk Reduction	Annualised Capex	Reasonably Practicable?[6]
A	1.65	0.49	Y (33 CBs)
B	2.22	1.04	Y (53 CBs)

4.4 Preferred option

The list of the projects and options for each of the 184 CBs evaluated is included in Appendix B.

This criteria results in 130 circuit breaker replacement projects that are recommended to be progressed at a total program cost of $42.32 million. This includes:

- 69 circuit breakers under Option A (LHCB) with total cost of $20.21 million, and
- 61 circuit breakers under Option B (DTCBs) with total cost of $22.12 million.

A list of the 130 recommended CB replacement projects is included in Appendix C.

An additional $0.40 million to trial CBs utilising SF_6 alternative technologies is also recommended, which increases the program total to $42.72 million.

Replacement of a circuit breaker under the preferred option fully meets the need by achieving the risk reduction outlined in Section 3.

The remaining 54 circuit breakers evaluated do not meet this criteria and are not recommended to be replaced under this need.

Capital and Operating Expenditure

Opex cost benefits associated reduced corrective expenditure has been allowed for in economic evaluation and optimal timing evaluation.

There are no capex to opex trade-offs considered in this evaluation.

Regulatory Investment Test

[5] 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.

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

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 cost of the option.

The results of optimal timing analysis for each circuit breaker project within the program is included in Appendix B.

This OER recommends progressing only positive business cases which are optimally timed before the end of the 2023 - 2028 Regulatory Period, hence all projects are evaluated for benefit in the final year of the period. The summary of the optimal timing at the program level is:

- Evaluation commissioning year: 2027/28
- Commissioning year annual benefit: $23.10 million
- Annualised cost: $2.40 million

6. Recommendation

It is recommended to proceed with implementing N2345 circuit breaker program replacement of 130 circuit breakers at a total program cost of $42.72 million consisting of $20.21 million LHCB replacements, $22.12 million DTCB replacements, and $0.40 million for non-conventional CB replacement solutions.

The total program cost includes an allowance of $10.40 million to progress the project to from Decision Gate 1 (DG1) to Decision Gate 2 (DG2).

The list of the 130 recommended CB replacement projects are included in Appendix C.

Appendix A – Option Summaries

Project Description	FY24-28 Circuit Breaker Renewal Program		
Option Description	Option A — Replace with conventional LHCB – 69 CBs		
Project Summary			
Option Rank	*1*	Investment Assessment Period	*25*
Asset Life	*40*	NPV Year	*2021*
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	*266.39*	Annualised CAPEX ($m)	*1.15*
NPV @ Lower Bound Scenario (PV, $m)	*115.42*	Network Safety Risk Reduction ($m)	*2.04*
NPV @ Higher Bound Scenario (PV, $m)	*577.51*	ALARP	*Program – See Appendix B*
NPV Weighted (PV, $m)	*306.43*	Optimal Timing	*Program – See Appendix B*
Cost			
Direct Capex ($m)	*17.11*	Network and Corporate Overheads ($m)	*3.10*
Total Capex ($m)	*20.21*	Cost Capex (PV,$m)	*14.55*
Terminal Value ($m)	*7.07*	Terminal Value (PV,$m)	*1.58*
Risk (central scenario)	**Pre**	**Post**	**Benefit**
Reliability (PV,$m)	Reliability Risk (Pre) *259.79*	Reliability Risk (Post) *4.38*	Pre – Post *255.41*
Financial (PV,$m)	Financial Risk (Pre) *3.17*	Financial Risk (Post) *0.05*	Pre – Post *3.13*
Operational/Compliance (PV,$m)	Operational Risk (Pre) *0.00*	Operational Risk (Post) *0.00*	Pre – Post *0.00*
Safety (PV,$m)	Safety Risk (Pre) *13.53*	Safety Risk (Post) *0.17*	Pre – Post *13.36*
Environmental (PV,$m)	Environmental Risk (Pre) *4.00*	Environmental Risk (Post) *0.05*	Pre – Post *3.94*
Reputational ($m)	Reputational Risk (Pre) *0.94*	Reputational Risk (Post) *0.01*	Pre – Post *0.93*
Total Risk Benefit (PV,$m)	Total Risk (Pre) *281.44*	Total Risk (Post) *4.67*	Pre – Post *276.77*
OPEX Benefit (PV,$m)			OPEX Benefit *2.60*
Other benefit (PV,$m)			Incremental Net Benefit *0.00*
Total Benefit (PV,$m)			Business Case Total Benefit *279.37*

Project Description	FY24-28 Circuit Breaker Renewal Program		
Option Description	Option B — Replace with conventional DTCB – 61 CBs		
Project Summary			
Option Rank	*1*	Investment Assessment Period	*25*
Asset Life	*40*	NPV Year	*2021*
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	*181.55*	Annualised CAPEX ($m)	*1.25*
NPV @ Lower Bound Scenario (PV, $m)	*75.99*	Network Safety Risk Reduction ($m)	*2.37*
NPV @ Higher Bound Scenario (PV, $m)	*396.97*	ALARP	*Program – See Appendix B*
NPV Weighted (PV, $m)	*209.01*	Optimal Timing	*Program – See Appendix B*
Cost			
Direct Capex ($m)	*18.88*	Network and Corporate Overheads ($m)	*3..24*
Total Capex ($m)	*22.12*	Cost Capex (PV,$m)	*15.93*
Terminal Value ($m)	*7.74*	Terminal Value (PV,$m)	*1.73*
Risk (central scenario)	**Pre**	**Post**	**Benefit**
Reliability (PV,$m)	Reliability Risk (Pre) *162.16*	Reliability Risk (Post) *1.34*	Pre – Post *160.82*
Financial (PV,$m)	Financial Risk (Pre) *2.04*	Financial Risk (Post) *0.02*	Pre – Post *2.02*
Operational/Compliance (PV,$m)	Operational Risk (Pre) *0.00*	Operational Risk (Post) *0.00*	Pre – Post *0.00*
Safety (PV,$m)	Safety Risk (Pre) *19.79*	Safety Risk (Post) *0.12*	Pre – Post *19.67*
Environmental (PV,$m)	Environmental Risk (Pre) *9.47*	Environmental Risk (Post) *0.06*	Pre – Post *9.41*
Reputational ($m)	Reputational Risk (Pre) *2.14*	Reputational Risk (Post) *0.01*	Pre – Post *2.13*
Total Risk Benefit (PV,$m)	Total Risk (Pre) *195.61*	Total Risk (Post) *1.54*	Pre – Post *194.07*
OPEX Benefit (PV,$m)			OPEX Benefit *1.68*
Other benefit (PV,$m)			Incremental Net Benefit *0.00*
Total Benefit (PV,$m)			Business Case Total Benefit *195.75*

Appendix B – CB Option Evaluation Summary

The following table provides a summary of the individual option evaluations of the 184 circuit breakers evaluated under this OER. The alternate cell shading is provided to group options evaluated for a single circuit breaker replacement. Each circuit breaker is evaluated under option A, Option B or both; refer to 3.2 Options evaluated for further details.

A circuit breaker project is included in the final program if it is NPV positive, highest rank ("Rank 1") and is optimally timed prior to 2027/28. 130 circuit breakers which meet the criteria are recommended to proceed under this OER and are indicated in the table where indicated with "Yes" in the "Included in the final program" column. Where the optimal timing is calculated as prior to 2023/24 the year is stated as 2023/24 which is the earliest practicable year for completion. The actual program phasing will depend on the final developed portfolio. The 130 recommended circuit breaker replacements are also shown in Appendix C.

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
CMSDPT1D1	A	$430,352	$5,412	No	2040/41	$11,999	$24,397	Rank 1	No
CMSDPT1K	A	$430,352	$13,609	No	2039/40	$11,983	$24,397	Rank 1	No
CMSDPT1Q	A	$430,352	$54,457	No	2037/38	$14,080	$24,397	Rank 1	No
CMSDPT2A1	A	$252,794	$1,066,318	Yes	2023/24	$56,786	$14,331	Rank 1	Yes
CMSDPT2D1	A	$252,794	$406,912	Yes	2023/24	$26,675	$14,331	Rank 1	Yes
CMSDPT2D2	A	$252,794	$787,664	Yes	2023/24	$44,245	$14,331	Rank 2	No
CMSDPT2D2	B	$383,156	$1,716,979	Yes	2023/24	$95,920	$21,721	Rank 1	Yes
CMSDPT2E1	A	$252,794	$499,316	Yes	2023/24	$31,267	$14,331	Rank 1	Yes
CMSDPT2E2	A	$252,794	$787,664	Yes	2023/24	$44,245	$14,331	Rank 2	No
CMSDPT2E2	B	$383,156	$1,667,590	Yes	2023/24	$92,658	$21,721	Rank 1	Yes
CMSDPT2F	A	$252,794	$2,167,299	Yes	2023/24	$106,338	$14,331	Rank 1	Yes
CMSDPT2J2	A	$264,332	$163,175	No	2030/31	$12,726	$14,985	Rank 1	No
CMSDPT2M	A	$252,794	$481,440	Yes	2023/24	$29,975	$14,331	Rank 1	Yes
CMSDPT2V1	A	$252,794	$852,998	Yes	2023/24	$47,185	$14,331	Rank 1	Yes
CMSDPT2W	A	$252,794	$867,044	Yes	2023/24	$47,817	$14,331	Rank 2	No

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
CMSDPT2W	B	$383,156	$1,955,752	Yes	2023/24	$107,409	$21,721	Rank 1	Yes
CMSKCR0B2	A	$535,000	$98,518	No	2035/36	$19,920	$30,330	Rank 1	No
CMSRGV2C	A	$211,394	$354,621	No	2023/24	$19,294	$11,984	Rank 1	Yes
CMSRGV2E	A	$265,532	$244,618	No	2027/28	$15,983	$15,053	Rank 1	Yes
CMSRGV2F	A	$265,532	$235,693	No	2027/28	$15,276	$15,053	Rank 1	Yes
CMSRGV2G	A	$211,394	$361,973	No	2023/24	$18,664	$11,984	Rank 1	Yes
CMSRGV2K	A	$211,394	$13,127,390	Yes	2023/24	$495,171	$11,984	Rank 1	Yes
CMSSE12B2	A	$211,394	$94,923	No	2031/32	$9,172	$11,984	Rank 2	No
CMSSE12B2	B	$333,856	$656,018	Yes	2023/24	$44,670	$18,927	Rank 1	Yes
CMSSE12HU	A	$264,332	$101,186	No	2032/33	$11,375	$14,985	Rank 1	No
CMSSE12LU	A	$211,394	$442,995	No	2023/24	$21,009	$11,984	Rank 1	Yes
CMSSYN1G2	A	$430,352	-$31,915	No	2042/43	$10,405	$24,397	Rank 1	No
CMSSYN1L3	A	$430,352	$49,464	No	2037/38	$14,862	$24,397	Rank 1	No
CMSSYS1D1	A	$430,352	$479,062	Yes	2023/24	$38,773	$24,397	Rank 2	No
CMSSYS1D1	B	$694,780	$1,148,098	Yes	2023/24	$85,529	$39,388	Rank 1	Yes
CMSSYS1J3	A	$430,352	$446,890	Yes	2023/24	$36,709	$24,397	Rank 1	Yes
CMSSYS1N2	A	$430,352	$1,224,464	Yes	2023/24	$73,340	$24,397	Rank 1	Yes
CMSSYS1N3	A	$430,352	$1,365,184	Yes	2023/24	$79,969	$24,397	Rank 1	Yes
CMSSYS1S3	A	$430,352	$80,704	No	2035/36	$15,036	$24,397	Rank 1	No
CMSSYS2W	A	$211,394	$4,974,966	Yes	2023/24	$199,937	$11,984	Rank 1	Yes
CMSSYW1B1	A	$430,352	$439,117	No	2026/27	$27,415	$24,397	Rank 1	Yes
CMSSYW1C1	A	$430,352	$691,344	No	2023/24	$38,140	$24,397	Rank 1	Yes
CMSSYW1E3	A	$430,352	$536,048	No	2024/25	$31,614	$24,397	Rank 1	Yes
CMSSYW1H3	A	$430,352	$718,827	No	2023/24	$41,758	$24,397	Rank 1	Yes
CMSSYW1L2	A	$430,352	$884,157	No	2023/24	$48,324	$24,397	Rank 1	Yes

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
CMSSYW1N	A	$430,352	$124,297	No	2034/35	$16,225	$24,397	Rank 1	No
CMSSYW1Q	A	$430,352	$656,619	No	2023/24	$38,488	$24,397	Rank 1	Yes
CMSSYW2C2	A	$252,794	$1,836,173	Yes	2023/24	$75,687	$14,331	Rank 2	No
CMSSYW2C2	B	$383,156	$4,934,380	Yes	2023/24	$230,761	$21,721	Rank 1	Yes
CMSSYW2H	A	$252,794	$362,245	No	2023/24	$21,239	$14,331	Rank 1	Yes
CMSSYW2L	A	$252,794	$274,031	No	2024/25	$17,879	$14,331	Rank 1	Yes
CMSSYW2M	A	$252,794	$2,927,073	Yes	2023/24	$124,016	$14,331	Rank 1	Yes
CMSSYW2P	A	$252,794	$2,359,526	Yes	2023/24	$103,500	$14,331	Rank 2	No
CMSSYW2P	B	$383,156	$6,475,050	Yes	2023/24	$327,906	$21,721	Rank 1	Yes
CMSVYD1AE	A	$430,352	$706,255	No	2023/24	$40,419	$24,397	Rank 2	No
CMSVYD1AE	B	$694,780	$1,590,051	No	2023/24	$87,326	$39,388	Rank 1	Yes
CMSVYD1BD	A	$430,352	$675,361	No	2023/24	$39,217	$24,397	Rank 2	No
CMSVYD1BD	B	$694,780	$1,512,621	No	2023/24	$84,045	$39,388	Rank 1	Yes
CMSVYD1BE	A	$430,352	$597,757	No	2023/24	$34,653	$24,397	Rank 2	No
CMSVYD1BE	B	$694,780	$1,479,667	No	2023/24	$81,477	$39,388	Rank 1	Yes
CMSVYD2B	A	$211,394	$546,911	No	2023/24	$28,208	$11,984	Rank 2	No
CMSVYD2B	B	$333,856	$1,335,811	Yes	2023/24	$71,868	$18,927	Rank 1	Yes
CMSVYD2G	A	$211,394	$630,286	No	2023/24	$28,201	$11,984	Rank 2	No
CMSVYD2G	B	$333,856	$1,587,167	Yes	2023/24	$78,872	$18,927	Rank 1	Yes
CMSVYD2H	A	$211,394	$242,705	No	2025/26	$14,425	$11,984	Rank 2	No
CMSVYD2H	B	$333,856	$803,907	Yes	2023/24	$44,559	$18,927	Rank 1	Yes
CMSVYD2J	A	$211,394	$731,766	No	2023/24	$33,345	$11,984	Rank 2	No
CMSVYD2J	B	$333,856	$1,717,045	Yes	2023/24	$85,906	$18,927	Rank 1	Yes
COSFB22G	A	$211,394	$3,653,822	Yes	2023/24	$184,986	$11,984	Rank 1	Yes
COSFB24S1	A	$184,887	$1,361,139	No	2023/24	$53,453	$10,481	Rank 1	Yes

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
COSMTP2F	A	$211,394	$314,177	Yes	2023/24	$21,829	$11,984	Rank 2	No
COSMTP2F	B	$333,856	$622,746	Yes	2023/24	$39,937	$18,927	Rank 1	Yes
COSPKS1B1	A	$211,394	$7,167,699	Yes	2023/24	$279,248	$11,984	Rank 2	No
COSPKS1B1	B	$333,856	$14,317,830	Yes	2023/24	$637,126	$18,927	Rank 1	Yes
COSPKS1D	A	$211,394	$2,910,005	Yes	2023/24	$117,065	$11,984	Rank 2	No
COSPKS1D	B	$333,856	$7,162,039	Yes	2023/24	$325,954	$18,927	Rank 1	Yes
COSPKS1G	A	$211,394	$2,341,555	No	2023/24	$89,025	$11,984	Rank 2	No
COSPKS1G	B	$333,856	$6,677,754	Yes	2023/24	$304,172	$18,927	Rank 1	Yes
COSPKS2B	A	$184,887	$4,175,296	Yes	2023/24	$160,881	$10,481	Rank 2	No
COSPKS2B	B	$328,264	$7,070,130	Yes	2023/24	$308,585	$18,610	Rank 1	Yes
COSPKS2M	A	$184,887	$81,063	No	2031/32	$7,955	$10,481	Rank 2	No
COSPKS2M	B	$328,264	$340,205	No	2023/24	$24,979	$18,610	Rank 1	Yes
COSWL12E	A	$211,394	$448,814	No	2023/24	$21,751	$11,984	Rank 2	No
COSWL12E	B	$333,856	$1,469,901	Yes	2023/24	$81,458	$18,927	Rank 1	Yes
COSWL12L	A	$211,394	$2,016,285	Yes	2023/24	$119,317	$11,984	Rank 1	Yes
COSWL12M	A	$211,394	$391,548	Yes	2023/24	$30,324	$11,984	Rank 1	Yes
COSWL12T	A	$211,394	$194,476	No	2027/28	$12,394	$11,984	Rank 1	Yes
COSWW11B5	A	$430,352	$143,788	No	2029/30	$23,064	$24,397	Rank 1	No
COSWW11C2	A	$430,352	$72,802	No	2034/35	$19,086	$24,397	Rank 2	No
COSWW11C2	B	$694,780	$79,398	No	2036/37	$27,238	$39,388	Rank 1	No
COSWW11C3	A	$430,352	$87,341	No	2033/34	$20,052	$24,397	Rank 1	No
NNSBAY1BE2	A	$430,352	$207,089	No	2026/27	$26,132	$24,397	Rank 1	Yes
NNSLD11AC2	A	$430,352	-$42,876	No	2044/45	$11,030	$24,397	Rank 1	No
NNSLD11AD2	A	$430,352	-$90,056	No	2048/49	$8,390	$24,397	Rank 1	No
NNSLD11BD2	A	$430,352	-$29,934	No	2043/44	$11,773	$24,397	Rank 1	No

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
NNSLD11BG2	A	$430,352	-$78,804	No	2047/48	$9,006	$24,397	Rank 1	No
NNSLD11BJ2	A	$430,352	-$93,807	No	2049/50	$8,260	$24,397	Rank 1	No
NNSLD11BK2	A	$430,352	$149,669	No	2030/31	$22,043	$24,397	Rank 1	No
NNSLD11C	A	$430,352	-$26,100	No	2042/43	$12,171	$24,397	Rank 1	No
NNSMN11A3	A	$430,352	$95,611	No	2034/35	$18,010	$24,397	Rank 1	No
NNSMN11AE2	A	$430,352	-$30,249	No	2043/44	$12,945	$24,397	Rank 1	No
NNSMN11BE2	A	$430,352	-$30,249	No	2043/44	$12,945	$24,397	Rank 1	No
NNSMN11BF2	A	$430,352	-$41,562	No	2044/45	$12,241	$24,397	Rank 1	No
NNSMN11C3	A	$430,352	-$30,249	No	2043/44	$12,945	$24,397	Rank 1	No
NNSNEW2A1	A	$252,794	$629,114	Yes	2023/24	$37,109	$14,331	Rank 1	Yes
NNSNEW2HZ	A	$264,332	$195,205	No	2028/29	$14,190	$14,985	Rank 1	No
NNSNEW2N	A	$252,794	$367,315	No	2023/24	$23,667	$14,331	Rank 1	Yes
NNSNEW2P	A	$211,394	$503,207	Yes	2023/24	$29,518	$11,984	Rank 1	Yes
NNSNEW2V	A	$252,794	$497,715	No	2023/24	$29,675	$14,331	Rank 1	Yes
NNSPMQ2B1	A	$211,394	$1,146,905	No	2023/24	$56,093	$11,984	Rank 2	No
NNSPMQ2B1	B	$333,856	$2,399,182	Yes	2023/24	$121,568	$18,927	Rank 1	Yes
NNSPMQ2E	A	$211,394	$220,975	Yes	2023/24	$19,115	$11,984	Rank 1	Yes
NNSWRH2C1	A	$211,394	$578,648	Yes	2023/24	$36,922	$11,984	Rank 2	No
NNSWRH2C1	B	$333,856	$979,208	Yes	2023/24	$59,463	$18,927	Rank 1	Yes
NNSWRH2C2	A	$211,394	$538,007	Yes	2023/24	$34,442	$11,984	Rank 2	No
NNSWRH2C2	B	$333,856	$941,727	Yes	2023/24	$57,516	$18,927	Rank 1	Yes
NNSWRH2M	A	$211,394	$640,482	Yes	2023/24	$40,000	$11,984	Rank 2	No
NNSWRH2M	B	$333,856	$1,059,595	Yes	2023/24	$63,551	$18,927	Rank 1	Yes
NNSWRH2Q	A	$211,394	$539,033	Yes	2023/24	$34,492	$11,984	Rank 2	No
NNSWRH2Q	B	$333,856	$977,687	Yes	2023/24	$59,627	$18,927	Rank 1	Yes

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
NNSWRH2V	A	$211,394	$640,584	Yes	2023/24	$40,005	$11,984	Rank 2	No
NNSWRH2V	B	$333,856	$1,118,198	Yes	2023/24	$67,452	$18,927	Rank 1	Yes
NNSWRH2X2	A	$211,394	$558,226	Yes	2023/24	$35,905	$11,984	Rank 2	No
NNSWRH2X2	B	$333,856	$945,373	Yes	2023/24	$57,813	$18,927	Rank 1	Yes
NNSWRH2X3	A	$211,394	$491,370	Yes	2023/24	$32,151	$11,984	Rank 2	No
NNSWRH2X3	B	$333,856	$890,437	Yes	2023/24	$55,603	$18,927	Rank 1	Yes
NTSAR12Z	A	$265,532	$240,118	No	2026/27	$16,963	$15,053	Rank 1	Yes
NTSCOF2L	A	$265,532	$140,860	No	2030/31	$12,892	$15,053	Rank 2	No
NTSCOF2L	B	$405,808	$446,058	No	2024/25	$30,464	$23,006	Rank 1	Yes
NTSGN22A1	A	$211,394	$7,191,332	Yes	2023/24	$361,314	$11,984	Rank 2	No
NTSGN22A1	B	$333,856	$9,239,111	Yes	2023/24	$463,286	$18,927	Rank 1	Yes
NTSGN22B1	A	$211,394	$6,586,559	Yes	2023/24	$322,580	$11,984	Rank 2	No
NTSGN22B1	B	$333,856	$9,705,831	Yes	2023/24	$475,977	$18,927	Rank 1	Yes
NTSGN22E	A	$211,394	$3,255,403	Yes	2023/24	$165,677	$11,984	Rank 1	Yes
NTSGN22H	A	$211,394	$3,174,229	Yes	2023/24	$163,957	$11,984	Rank 1	Yes
NTSGN24A	A	$184,887	$3,930,299	Yes	2023/24	$191,883	$10,481	Rank 2	No
NTSGN24A	B	$328,264	$5,260,584	Yes	2023/24	$260,419	$18,610	Rank 1	Yes
NTSGN24B	A	$184,887	$3,922,463	Yes	2023/24	$191,514	$10,481	Rank 2	No
NTSGN24B	B	$328,264	$5,732,462	Yes	2023/24	$293,373	$18,610	Rank 1	Yes
NTSGN24H	A	$184,887	$303,387	Yes	2023/24	$21,323	$10,481	Rank 1	Yes
NTSGN24J	A	$184,887	$2,769,181	Yes	2023/24	$139,167	$10,481	Rank 1	Yes
NTSGN24K	A	$184,887	$301,623	Yes	2023/24	$21,238	$10,481	Rank 1	Yes
NTSGN24M	A	$184,887	$1,751,381	Yes	2023/24	$90,524	$10,481	Rank 2	No
NTSGN24M	B	$328,264	$2,462,187	Yes	2023/24	$129,769	$18,610	Rank 1	Yes
NTSINV2C2	A	$211,394	$3,872,282	Yes	2023/24	$198,252	$11,984	Rank 1	Yes

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
NTSINV2G2	A	$211,394	$3,742,064	Yes	2023/24	$191,854	$11,984	Rank 2	No
NTSINV2G2	B	$333,856	$6,339,926	Yes	2023/24	$321,598	$18,927	Rank 1	Yes
NTSINV4A	A	$184,887	$5,305,546	Yes	2023/24	$264,048	$10,481	Rank 2	No
NTSINV4A	B	$328,264	$7,078,376	Yes	2023/24	$357,143	$18,610	Rank 1	Yes
NTSINV4J	A	$184,887	$315,542	Yes	2023/24	$22,209	$10,481	Rank 2	No
NTSINV4J	B	$328,264	$588,903	Yes	2023/24	$40,281	$18,610	Rank 1	Yes
NTSINV4K	A	$184,887	$441,262	Yes	2023/24	$28,302	$10,481	Rank 2	No
NTSINV4K	B	$328,264	$742,484	Yes	2023/24	$47,571	$18,610	Rank 1	Yes
NTSKLK4B	A	$184,887	$61,481	No	2033/34	$7,437	$10,481	Rank 1	No
NTSLSM1A1	A	$430,352	$6,768	No	2040/41	$12,048	$24,397	Rank 1	No
NTSLSM1B1	A	$430,352	$60,275	No	2036/37	$14,959	$24,397	Rank 1	No
NTSLSM1C2	A	$430,352	$58,633	No	2036/37	$14,232	$24,397	Rank 1	No
NTSLSM1D	A	$480,818	$31,987	No	2038/39	$15,030	$27,258	Rank 1	No
NTSLSM1J	A	$480,818	$189,351	No	2030/31	$24,436	$27,258	Rank 1	No
NTSLSM2A	A	$211,394	$110,416	No	2030/31	$9,961	$11,984	Rank 2	No
NTSLSM2A	B	$333,856	$520,880	Yes	2023/24	$35,080	$18,927	Rank 1	Yes
NTSLSM2B	A	$211,394	$1,367,782	No	2023/24	$55,739	$11,984	Rank 2	No
NTSLSM2B	B	$333,856	$3,926,884	Yes	2023/24	$186,211	$18,927	Rank 1	Yes
NTSLSM2C	A	$211,394	$135,013	No	2029/30	$11,112	$11,984	Rank 2	No
NTSLSM2C	B	$333,856	$534,749	Yes	2023/24	$35,261	$18,927	Rank 1	Yes
NTSLSM2F	A	$211,394	$130,092	No	2029/30	$10,928	$11,984	Rank 2	No
NTSLSM2F	B	$333,856	$501,428	Yes	2023/24	$33,109	$18,927	Rank 1	Yes
NTSLSM2J	A	$265,532	$1,536,407	No	2023/24	$66,341	$15,053	Rank 2	No
NTSLSM2J	B	$405,808	$4,174,231	Yes	2023/24	$202,534	$23,006	Rank 1	Yes
NTSLSM2L	A	$211,394	$2,110,675	Yes	2023/24	$93,892	$11,984	Rank 2	No

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
NTSLSM2L	B	$333,856	$4,730,068	Yes	2023/24	$227,316	$18,927	Rank 1	Yes
NTSMRE4G	A	$184,887	$1,969,420	Yes	2023/24	$102,364	$10,481	Rank 1	Yes
NTSMRE4K	A	$184,887	$613,212	Yes	2023/24	$36,636	$10,481	Rank 1	Yes
NTSNB24N	A	$184,887	$64,685	No	2033/34	$7,189	$10,481	Rank 2	No
NTSNB24N	B	$328,264	$296,760	No	2025/26	$22,047	$18,610	Rank 1	Yes
NTSTTF7A	A	$184,887	$508,422	No	2023/24	$25,343	$10,481	Rank 1	Yes
NTSTTF7F2	A	$184,887	$212,099	No	2024/25	$13,813	$10,481	Rank 1	Yes
NTSTTF7G2	A	$184,887	$194,444	No	2025/26	$12,848	$10,481	Rank 1	Yes
NTSTTF7K2	A	$184,887	$216,457	No	2023/24	$13,982	$10,481	Rank 1	Yes
SWSALB2J	A	$211,394	$3,807,513	Yes	2023/24	$141,129	$11,984	Rank 2	No
SWSALB2J	B	$333,856	$10,205,163	Yes	2023/24	$446,788	$18,927	Rank 1	Yes
SWSBKH3C2	A	$480,818	$1,152,990	No	2023/24	$56,795	$27,258	Rank 1	Yes
SWSBKH3C3	A	$480,818	$1,531,005	No	2023/24	$77,077	$27,258	Rank 1	Yes
SWSBKH3E2	A	$430,352	$100,973,770	Yes	2023/24	$3,858,912	$24,397	Rank 1	Yes
SWSBRG3C2	A	$430,352	$115,877,460	Yes	2023/24	$4,615,554	$24,397	Rank 1	Yes
SWSBRG3C3	A	$480,818	$1,839,159	No	2023/24	$96,291	$27,258	Rank 1	Yes
SWSBRG3D1	A	$430,352	$2,088,329	No	2023/24	$90,188	$24,397	Rank 1	Yes
SWSBRG3D3	A	$480,818	-$91,741	No	2049/50	$10,656	$27,258	Rank 1	No
SWSBRG3G1	A	$430,352	$1,233,210	No	2023/24	$56,996	$24,397	Rank 1	Yes
SWSDN22E	A	$211,394	$4,979,575	Yes	2023/24	$242,275	$11,984	Rank 1	Yes
SWSDNT2A	A	$211,394	$1,144,363	No	2023/24	$47,605	$11,984	Rank 2	No
SWSDNT2A	B	$333,856	$3,033,687	Yes	2023/24	$140,430	$18,927	Rank 1	Yes
SWSDNT2B	A	$211,394	$1,311,918	No	2023/24	$56,192	$11,984	Rank 2	No
SWSDNT2B	B	$333,856	$3,264,513	Yes	2023/24	$153,081	$18,927	Rank 1	Yes
SWSDNT2D	A	$211,394	$3,167,319	Yes	2023/24	$156,900	$11,984	Rank 2	No

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
SWSDNT2D	B	$333,856	$5,233,555	Yes	2023/24	$258,077	$18,927	Rank 1	Yes
SWSDNT2E1	A	$211,394	$2,814,767	Yes	2023/24	$144,321	$11,984	Rank 1	Yes
SWSDNT2F	A	$211,394	$2,926,663	Yes	2023/24	$147,668	$11,984	Rank 2	No
SWSDNT2F	B	$333,856	$5,268,241	Yes	2023/24	$269,056	$18,927	Rank 1	Yes
SWSDNT3C	A	$430,352	$78,389	No	2034/35	$17,285	$24,397	Rank 2	No
SWSDNT3C	B	$694,780	$224,895	No	2031/32	$32,208	$39,388	Rank 1	No
SWSDNT3D	A	$430,352	$12,645	No	2039/40	$13,144	$24,397	Rank 2	No
SWSDNT3D	B	$694,780	$189,029	No	2033/34	$29,581	$39,388	Rank 1	No
SWSDNT3E1	A	$430,352	-$4,244	No	2040/41	$12,225	$24,397	Rank 1	No
SWSDNT3F	A	$480,818	-$858	No	2040/41	$14,118	$27,258	Rank 1	No
SWSDNT6C	B	$388,303	$67,594	No	2034/35	$16,290	$22,013	Rank 1	No
SWSDNT6D	B	$388,303	-$25,093	No	2042/43	$10,703	$22,013	Rank 1	No
SWSFNY1A1	A	$211,394	$1,597,423	No	2023/24	$62,576	$11,984	Rank 2	No
SWSFNY1A1	B	$333,856	$3,121,258	No	2023/24	$134,096	$18,927	Rank 1	Yes
SWSFNY2F	A	$184,887	$120,345	No	2029/30	$9,351	$10,481	Rank 2	No
SWSFNY2F	B	$328,264	$418,264	No	2023/24	$27,873	$18,610	Rank 1	Yes
SWSGRF2B1	A	$211,394	$3,704,365	Yes	2023/24	$134,055	$11,984	Rank 1	Yes
SWSGRF6K	A	$184,887	$740,483	Yes	2023/24	$35,086	$10,481	Rank 2	No
SWSGRF6K	B	$328,264	$1,643,240	Yes	2023/24	$80,599	$18,610	Rank 1	Yes
SWSGRF6Q	A	$184,887	$2,867,049	Yes	2023/24	$126,588	$10,481	Rank 2	No
SWSGRF6Q	B	$328,264	$5,715,973	Yes	2023/24	$262,945	$18,610	Rank 1	Yes
SWSGRF6U	A	$184,887	$2,806,662	Yes	2023/24	$124,048	$10,481	Rank 2	No
SWSGRF6U	B	$328,264	$5,678,611	Yes	2023/24	$262,388	$18,610	Rank 1	Yes
SWSGRF6V	A	$184,887	$2,495,982	Yes	2023/24	$106,901	$10,481	Rank 2	No
SWSGRF6V	B	$328,264	$5,388,443	Yes	2023/24	$246,919	$18,610	Rank 1	Yes

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
SWSGRF6X	A	$184,887	$212,100	Yes	2023/24	$14,659	$10,481	Rank 2	No
SWSGRF6X	B	$328,264	$498,758	Yes	2023/24	$31,928	$18,610	Rank 1	Yes
SWSLT11HA	A	$430,352	-$86,753	No	2048/49	$8,724	$24,397	Rank 1	No
SWSLT11HB	A	$430,352	-$53,703	No	2045/46	$10,617	$24,397	Rank 1	No
SWSLT11JA	A	$430,352	-$76,842	No	2047/48	$9,300	$24,397	Rank 1	No
SWSLT11JB	A	$430,352	-$65,841	No	2046/47	$9,930	$24,397	Rank 1	No
SWSMUR1GA	A	$430,352	$265,142	No	2025/26	$27,322	$24,397	Rank 1	Yes
SWSMUR1GB	A	$430,352	$341,695	No	2023/24	$32,656	$24,397	Rank 1	Yes
SWSMUR1LA	A	$430,352	$296,161	No	2025/26	$27,385	$24,397	Rank 1	Yes
SWSMUR1MB	A	$430,352	$268,542	No	2024/25	$28,307	$24,397	Rank 1	Yes
SWSMUR1NB	A	$430,352	$676,564	Yes	2023/24	$56,855	$24,397	Rank 1	Yes
SWSMUR1PA	A	$430,352	$502,257	Yes	2023/24	$44,114	$24,397	Rank 1	Yes
SWSUT11E2	A	$430,352	-$10,877	No	2041/42	$13,032	$24,397	Rank 1	No
SWSUT11S2	A	$430,352	-$30,015	No	2043/44	$12,015	$24,397	Rank 1	No
SWSWG12N	A	$211,394	$525,230	No	2023/24	$25,064	$11,984	Rank 2	No
SWSWG12N	B	$333,856	$1,484,278	Yes	2023/24	$74,264	$18,927	Rank 1	Yes
SWSWG24AN	A	$251,453	$302,573	No	2023/24	$19,270	$14,255	Rank 1	Yes
SYSCA11M2	A	$430,352	-$48,228	No	2044/45	$10,342	$24,397	Rank 1	No
SYSCA11M3	A	$430,352	$7,812	No	2039/40	$13,518	$24,397	Rank 1	No
SYSCA12C1	A	$211,394	$171,594	No	2028/29	$11,898	$11,984	Rank 1	No
SYSMNY2A1	A	$211,394	$1,354,445	No	2023/24	$55,254	$11,984	Rank 1	Yes
SYSMNY2B1	A	$211,394	$1,357,209	No	2023/24	$55,354	$11,984	Rank 1	Yes
SYSMNY2E	A	$211,394	$1,455,974	No	2023/24	$60,327	$11,984	Rank 1	Yes
SYSMRN1F	A	$430,352	-$12,208	No	2041/42	$14,188	$24,397	Rank 2	No
SYSMRN1F	B	$694,780	$13,566	No	2039/40	$23,818	$39,388	Rank 1	No

Bay	Option	Capex	NPV (weighted)	ALARP	Optimal Timing	Total Benefit	Annual Capex	Preferred Option	Included in final program
SYSMRN2G	A	$211,394	$6,222,596	Yes	2023/24	$232,493	$11,984	Rank 2	No
SYSMRN2G	B	$333,856	$8,944,637	Yes	2023/24	$357,547	$18,927	Rank 1	Yes
SYSMRN2J	A	$211,394	$5,484,800	Yes	2023/24	$195,769	$11,984	Rank 2	No
SYSMRN2J	B	$333,856	$11,281,310	Yes	2023/24	$463,323	$18,927	Rank 1	Yes
SYSMRNDB2	A	$430,352	-$29,932	No	2043/44	$13,183	$24,397	Rank 1	No
SYSMRNDB2	B	$694,780	-$63,675	No	2044/45	$20,005	$39,388	Rank 2	No
SYSMRNDB3	A	$211,394	-$30,000	No	2045/46	$4,732	$11,984	Rank 2	No
SYSMRNDB3	B	$333,856	$53,780	No	2035/36	$12,404	$18,927	Rank 1	No
SYSMRNDGB	A	$430,352	$142,993	No	2031/32	$20,714	$24,397	Rank 1	No
SYSYSNAJ1	A	$480,818	-$50,898	No	2044/45	$11,942	$27,258	Rank 1	No
SYSYSNBAB1	A	$480,818	-$42,960	No	2043/44	$12,237	$27,258	Rank 1	No

Appendix C - N2345 Circuit Breaker Replacement Program

The table below identifies each of the 130 circuit breaker replacement projects recommended to progress under this OER. The table includes PIC (unique asset identifier) reference to the currently installed circuit breakers and where relevant for DTCB replacements, the associated CTs.

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
CMSDPT2A1	NO1 TRANSFORMER 132KV A BUS CB BAY	CB-EC00002828	Live Tank 132kV 50kA	$252,794	$1,066,318	Yes	2023/24
CMSDPT2D1	NO3 TRANSFORMER 132KV A BUS CB BAY	CB-EC00002693	Live Tank 132kV 50kA	$252,794	$406,912	Yes	2023/24
CMSDPT2D2	NO3 TRANSFORMER 132KV B BUS CB BAY	CB-EC00002694 CT-EC00002822 CT-EC00002820 CT-EC00002780	Dead Tank 132kV 50kA	$383,156	$1,716,979	Yes	2023/24
CMSDPT2E1	NO4 TRANSFORMER 132KV A BUS CB BAY	CB-EC00002823	Live Tank 132kV 50kA	$252,794	$499,316	Yes	2023/24
CMSDPT2E2	NO4 TRANSFORMER 132KV B BUS CB BAY	CB-EC00002824 CT-EC00002819 CT-EC00002846 CT-EC00005306	Dead Tank 132kV 50kA	$383,156	$1,667,590	Yes	2023/24
CMSDPT2F	98W MT TERRY 132KV FEEDER	CB-EC00002831	Live Tank 132kV 50kA	$252,794	$2,167,299	Yes	2023/24
CMSDPT2M	982 SPRINGHILL 132KV FEEDER	CB-EC00002830	Live Tank 132kV 50kA	$252,794	$481,440	Yes	2023/24
CMSDPT2V1	988 FAIRFAX LANE TEE 132KV FEEDER	CB-EC00002825	Live Tank 132kV 50kA	$252,794	$852,998	Yes	2023/24
CMSDPT2W	984 TALLAWARRA 132KV FEEDER	CB-EC00002947 CT-EC00002818	Dead Tank 132kV 50kA	$383,156	$1,955,752	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00002817 CT-EC00005310					
CMSRGV2C	238 PENRITH 132KV FEEDER	CB-ETA2314	Live Tank 132kV 40kA	$211,394	$354,621	No	2023/24
CMSRGV2E	NO.2 132KV CAPACITOR BANK	CB-ETA7543	Live Tank 132kV 40kA POW	$265,532	$244,618	No	2027/28
CMSRGV2F	NO.1 132KV CAPACITOR BANK	CB-ETA4810	Live Tank 132kV 40kA POW	$265,532	$235,693	No	2027/28
CMSRGV2G	232 GLENMORE PARK 132KV FEEDER	CB-ETA2313	Live Tank 132kV 40kA	$211,394	$361,973	No	2023/24
CMSRGV2K	NO1 BUS COUPLER 132KV BAY	CB-ETA2309	Live Tank 132kV 40kA	$211,394	$13,127,390	Yes	2023/24
CMSSE12B2	NO2 TRANSFORMER 132KV B BUS CB BAY	CB-ETA3996 CT-A02005/5 CT-EC00024926 CT-A02005/4	Dead Tank 132kV 40kA	$333,856	$656,018	Yes	2023/24
CMSSE12LU	NO7 TRANSFORMER 132KV CB BAY	CB-EC00020243	Live Tank 132kV 40kA	$211,394	$442,995	No	2023/24
CMSSYS1D1	NO5 TRANSFORMER 330KV CB BAY	CB-EC00017375 CT-BESS11/3 CT-BESS15/3 CT-EC00001476	Dead Tank 330kV 50kA	$694,780	$1,148,098	Yes	2023/24
CMSSYS1J3	13 KEMPS CREEK 330KV B BUS CB BAY	CB-EC00017378	Live Tank 330kV 50kA	$430,352	$446,890	Yes	2023/24
CMSSYS1N2	12 LIVERPOOL 330KV A BUS CB BAY	CB-EC00017379	Live Tank 330kV 50kA	$430,352	$1,224,464	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
CMSSYS1N3	12 LIVERPOOL 330KV B BUS CB BAY	CB-EC00017368	Live Tank 330kV 50kA	$430,352	$1,365,184	Yes	2023/24
CMSSYS2W	914 BANKSTOWN 132KV FEEDER BAY	CB-ETA2581	Live Tank 132kV 40kA	$211,394	$4,974,966	Yes	2023/24
CMSSYW1B1	NO2 TRANSFORMER 330KV CB BAY	CB-ETA2366	Live Tank 330kV 50kA	$430,352	$439,117	No	2026/27
CMSSYW1C1	NO3 TRANSFORMER 330KV CB BAY	CB-ETA2302	Live Tank 330kV 50kA	$430,352	$691,344	No	2023/24
CMSSYW1E3	1C HOLROYD 330KV B BUS CB BAY	CB-EC00024686	Live Tank 330kV 50kA	$430,352	$536,048	No	2024/25
CMSSYW1H3	32 BAYSWATER 330KV B BUS CB BAY	CB-EC00025072	Live Tank 330kV 50kA	$430,352	$718,827	No	2023/24
CMSSYW1L2	26 MUNMORAH 330KV A BUS CB	CB-EC00024723	Live Tank 330kV 50kA	$430,352	$884,157	No	2023/24
CMSSYW1Q	38 REGENTVILLE 330KV FEEDER BAY	CB-ETA3135	Live Tank 330kV 50kA	$430,352	$656,619	No	2023/24
CMSSYW2C2	NO3 TRANSFORMER 132KV B BUS CB BAY	CB-ETA1735 CT-EC00022720 CT-EC00022721 CT-EC00022746	Dead Tank 132kV 50kA	$383,156	$4,934,380	Yes	2023/24
CMSSYW2H	93U ABBOTSBURY 132KV FEEDER BAY	CB-ETA1704	Live Tank 132kV 50kA	$252,794	$362,245	No	2023/24
CMSSYW2L	9J2 BLACKTOWN 132KV FEEDER BAY	CB-ETA1709	Live Tank 132kV 50kA	$252,794	$274,031	No	2024/25
CMSSYW2M	9J1 BLACKTOWN 132KV FEEDER BAY	CB-ETA1710	Live Tank 132kV 50kA	$252,794	$2,927,073	Yes	2023/24
CMSSYW2P	B1-2 132KV BUS SECTION	CB-EC00023997 CT-EC00006072	Dead Tank 132kV 50kA	$383,156	$6,475,050	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00006061 CT-EC00006059					
CMSVYD1AE	25 ERARING 330KV A BUS CB BAY	CB-EC00024030 CT-ETA2261 CT-ETA2260 CT-ETA2262	Dead Tank 330kV 50kA	$694,780	$1,590,051	No	2023/24
CMSVYD1BD	29 SYDNEY WEST 330KV C BUS CB BAY	CB-EC00024028 CT-ETA2067 CT-ETA2068 CT-ETA2071	Dead Tank 330kV 50kA	$694,780	$1,512,621	No	2023/24
CMSVYD1BE	25 ERARING 330KV B BUS CB BAY	CB-EC00024029 CT-ETA2064 CT-ETA2069 CT-ETA2072	Dead Tank 330kV 50kA	$694,780	$1,479,667	No	2023/24
CMSVYD2B	NO2 TRANSFORMER 132KV CB BAY	CB-EC00023222 CT-EC00022776 CT-EC00022783 CT-EC00022784	Dead Tank 132kV 40kA	$333,856	$1,335,811	Yes	2023/24
CMSVYD2G	227 HAWKESBURY 132KV FDR BAY	CB-EC00023219 CT-EC00022790 CT-EC00022786 CT-EC00022792	Dead Tank 132kV 40kA	$333,856	$1,587,167	Yes	2023/24
CMSVYD2H	NO1 BUS COUPLER 132KV BAY	CB-EC00023217 CT-EC00022791 CT-ETA1307 CT-EC00022789	Dead Tank 132kV 40kA	$333,856	$803,907	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
CMSVYD2J	234 HAWKESBURY 132KV FDR BAY	CB-EC00023220 CT-EC00022782 CT-EC00022780 CT-EC00022785	Dead Tank 132kV 40kA	$333,856	$1,717,045	Yes	2023/24
COSFB22G	94U PARKES 132 - 132KV FEEDER BAY	CB-EC00002297	Live Tank 132kV 40kA	$211,394	$3,653,822	Yes	2023/24
COSFB24S1	896 WEST JEMALONG 66KV CB BAY	CB-ETA1711	Live Tank 66kV 40kA	$184,887	$1,361,139	No	2023/24
COSMTP2F	NO3 TRANSFORMER 132KV CB BAY/94Y FDR	CB-EC00013840 CT-EC00013909 CT-EC00013910 CT-EC00013906	Dead Tank 132kV 40kA	$333,856	$622,746	Yes	2023/24
COSPKS1B1	NO2 TRANSFORMER 132KV CB BAY	CB-EC00023210 CT-EC00022728 CT-EC00022725 CT-EC00022733	Dead Tank 132kV 40kA	$333,856	$14,317,830	Yes	2023/24
COSPKS1D	94U FORBES 132KV FEEDER BAY	CB-EC00023213 CT-EC00022729 CT-EC00022723 CT-EC00022722	Dead Tank 132kV 40kA	$333,856	$7,162,039	Yes	2023/24
COSPKS1G	94K WELLINGTON TEE WELLINGTON WEST 132KV	CB-EC00023211 CT-EC00022732 CT-EC00022731 CT-EC00022730	Dead Tank 132kV 40kA	$333,856	$6,677,754	Yes	2023/24
COSPKS2B	NO2 TRANSFORMER 66KV CB BAY	CB-EC00023231 CT-EC00023205	Dead Tank 66kV 40kA	$328,264	$7,070,130	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00023201 CT-EC00023207					
COSPKS2M	898 TRUNDLE 66KV FEEDER BAY	CB-EC00023232 CT-EC00023202 CT-EC00023200 CT-EC00023199	Dead Tank 66kV 40kA	$328,264	$340,205	No	2023/24
COSWL12E	94B BERYL 132KV FEEDER BAY	CB-ETA1695 CT-EC00003206 CT-EC00003205 CT-EC00002978	Dead Tank 132kV 40kA	$333,856	$1,469,901	Yes	2023/24
COSWL12L	A1-2 132KV BUS SECTION CB	CB-EC00024111	Live Tank 132kV 40kA	$211,394	$2,016,285	Yes	2023/24
COSWL12M	9GY DUBBO SOUTH 132KV FEEDER BAY	CB-EC00015157	Live Tank 132kV 40kA	$211,394	$391,548	Yes	2023/24
COSWL12T	947 ORANGE NORTH TEE B'DONG 132 FDR BAY	CB-ETA1696	Live Tank 132kV 40kA	$211,394	$194,476	No	2027/28
NNSBAY1BE2	SPARE BAY 3 EX 330KV GENERATOR CB BAY	CB-EC00008116	Live Tank 330kV 50kA	$430,352	$207,089	No	2026/27
NNSNEW2A1	NO1 TRANSFORMER 132KV A BUS CB BAY	CB-EC00005981	Live Tank 132kV 50kA	$252,794	$629,114	Yes	2023/24
NNSNEW2N	96Z MARYLAND 132KV FEEDER	CB-EC00010030	Live Tank 132kV 50kA	$252,794	$367,315	No	2023/24
NNSNEW2P	NO1-2 132KV B BUS SECTION	CB-EC00013833	Live Tank 132kV 40kA	$211,394	$503,207	Yes	2023/24
NNSNEW2V	9NA BERESFIELD 132KV FEEDER	CB-EC00005978	Live Tank 132kV 50kA	$252,794	$497,715	No	2023/24
NNSPMQ2B1	NO2 TRANSFORMER 132KV CB BAY	CB-EC00020412	Dead Tank	$333,856	$2,399,182	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00013894 CT-EC00013887 CT-EC00013888	132kV 40kA				
NNSPMQ2E	96G KEMPSEY 132KV FEEDER	CB-EC00009154	Live Tank 132kV 40kA	$211,394	$220,975	Yes	2023/24
NNSWRH2C1	NO 3 TRANSFORMER 132KV A CIRCUIT BREAKER	CB-EC00013845 CT-EC00020917 CT-EC00020923 CT-EC00020916	Dead Tank 132kV 40kA	$333,856	$979,208	Yes	2023/24
NNSWRH2C2	NO 3 TRANSFORMER 132KV B CIRCUIT BREAKER	CB-EC00005975 CT-EC00020914 CT-EC00020894 CT-EC00020890	Dead Tank 132kV 40kA	$333,856	$941,727	Yes	2023/24
NNSWRH2M	96Y MAYFIELD WEST 132KV FEEDER	CB-EC00013837 CT-EC00020919 CT-EC00020915 CT-EC00013933	Dead Tank 132kV 40kA	$333,856	$1,059,595	Yes	2023/24
NNSWRH2Q	962 TOMAGO 132 SS - 132KV FEEDER	CB-EC00013836 CT-EC00020913 CT-EC00013924 CT-EC00020912	Dead Tank 132kV 40kA	$333,856	$977,687	Yes	2023/24
NNSWRH2V	96X KOORAGANG 132KV FEEDER	CB-EC00013844 CT-EC00020918 CT-EC00020895 CT-EC00020889	Dead Tank 132kV 40kA	$333,856	$1,118,198	Yes	2023/24
NNSWRH2X2	95N NEWCASTLE 132KV A BUS CB BAY	CB-EC00013846	Dead Tank	$333,856	$945,373	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00020922 CT-EC00020920 CT-EC00020921	132kV 40kA				
NNSWRH2X3	95N NEWCASTLE 132KV B BUS CB BAY	CB-EC00013843 CT-EC00020897 CT-EC00020896 CT-EC00020892	Dead Tank 132kV 40kA	$333,856	$890,437	Yes	2023/24
NTSAR12Z	NO1 132KV CAPACITOR	CB-ETA3333	Live Tank 132kV 40kA POW	$265,532	$240,118	No	2026/27
NTSCOF2L	NO4 132KV CAPACITOR	CB-ETA3838 CT-ETA6724 CT-ETA6723 CT-ETA6722	Dead Tank 132kV 40kA POW	$405,808	$446,058	No	2024/25
NTSGN22A1	NO1 TRANSFORMER 132KV CB BAY	CB-EC00009631 CT-EC00022771 CT-EC00022715 CT-TG013133	Dead Tank 132kV 40kA	$333,856	$9,239,111	Yes	2023/24
NTSGN22B1	NO2 TRANSFORMER 132KV CB BAY	CB-EC00009632 CT-EC00010063 CT-EC00006286 CT-EC00006287	Dead Tank 132kV 40kA	$333,856	$9,705,831	Yes	2023/24
NTSGN22E	969 TAMWORTH 132KV FEEDER	CB-EC00009634	Live Tank 132kV 40kA	$211,394	$3,255,403	Yes	2023/24
NTSGN22H	9U3 BOGGABRI EAST TEE GUNNEDAH EAST 132	CB-EC00009633	Live Tank 132kV 40kA	$211,394	$3,174,229	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
NTSGN24A	NO1 TRANSFORMER 66KV CB BAY	CB-EC00007882 CT-EC00008073 CT-EC00008071 CT-EC00008075	Dead Tank 66kV 40kA	$328,264	$5,260,584	Yes	2023/24
NTSGN24B	NO2 TRANSFORMER 66KV CB BAY	CB-EC00007883 CT-EC00006860 CT-EC00007974 CT-EC00007987	Dead Tank 66kV 40kA	$328,264	$5,732,462	Yes	2023/24
NTSGN24H	88K GUNNEDAH 66 SS - 66KV FEEDER	CB-EC00007872	Live Tank 66kV 40kA	$184,887	$303,387	Yes	2023/24
NTSGN24J	NO2 66KV BUS SECTION	CB-EC00007871	Live Tank 66kV 40kA	$184,887	$2,769,181	Yes	2023/24
NTSGN24K	88L GUNNEDAH 66 SS - 66KV FEEDER	CB-EC00007869	Live Tank 66kV 40kA	$184,887	$301,623	Yes	2023/24
NTSGN24M	877 KEEPIT PS 66KV FEEDER	CB-EC00007863 CT-EC00008023 CT-EC00008016 CT-EC00008019	Dead Tank 66kV 40kA	$328,264	$2,462,187	Yes	2023/24
NTSINV2C2	9U2 MOREE 132KV CB BAY	CB-EC00005965	Live Tank 132kV 40kA	$211,394	$3,872,282	Yes	2023/24
NTSINV2G2	96N ARMIDALE 330 - 132KV CB BAY	CB-EC00005967 CT-EC00005995 CT-EC00006037 CT-EC00006040	Dead Tank 132kV 40kA	$333,856	$6,339,926	Yes	2023/24
NTSINV4A	NO1 TRANSFORMER 66KV CB BAY	CB-EC00007536 CT-EC00007355	Dead Tank 66kV 40kA	$328,264	$7,078,376	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00007361 CT-EC00007363					
NTSINV4J	733 GLEN INNES 66 - 66KV FEEDER	CB-EC00007537 CT-EC00007931 CT-EC00007944 CT-EC00007938	Dead Tank 66kV 40kA	$328,264	$588,903	Yes	2023/24
NTSINV4K	734 INVERELL 66 - 66KV FEEDER	CB-EC00007538 CT-EC00006859 CT-EC00006857 CT-EC00006868	Dead Tank 66kV 40kA	$328,264	$742,484	Yes	2023/24
NTSLSM2A	NO1 TRANSFORMER 132KV CB BAY	CB-EC00023639 CT-EC00023689 CT-EC00023690 CT-EC00023688	Dead Tank 132kV 40kA	$333,856	$520,880	Yes	2023/24
NTSLSM2B	NO2 TRANSFORMER 132KV CB BAY	CB-EC00023638 CT-EC00023682 CT-EC00023684 CT-EC00023683	Dead Tank 132kV 40kA	$333,856	$3,926,884	Yes	2023/24
NTSLSM2C	967 KOOLKHAN 132KV FEEDER	CB-EC00023630 CT-EC00023662 CT-EC00023663 CT-EC00023661	Dead Tank 132kV 40kA	$333,856	$534,749	Yes	2023/24
NTSLSM2F	9U9 LISMORE 132KV FEEDER	CB-EC00023632 CT-EC00023669 CT-EC00023667 CT-EC00023668	Dead Tank 132kV 40kA	$333,856	$501,428	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
NTSLSM2J	NO2 132KV CAPACITOR	CB-ETA3587 CT-EC00023675 CT-EC00023673 CT-EC00023674	Dead Tank 132kV 40kA POW	$405,808	$4,174,231	Yes	2023/24
NTSLSM2L	96L TENTERFIELD 132KV FEEDER	CB-EC00023636 CT-EC00023681 CT-EC00023679 CT-EC00023680	Dead Tank 132kV 40kA	$333,856	$4,730,068	Yes	2023/24
NTSMRE4G	721 MOREE 66KV FEEDER	CB-EC00006744	Live Tank 66kV 40kA	$184,887	$1,969,420	Yes	2023/24
NTSMRE4K	722 MOREE 66KV FEEDER	CB-EC00006749	Live Tank 66kV 40kA	$184,887	$613,212	Yes	2023/24
NTSNB24N	879 WEE WAA 66KV FEEDER	CB-ETA2649 CT-ETA1937 CT-ETA1935 CT-ETA1936	Dead Tank 66kV 40kA	$328,264	$296,760	No	2025/26
NTSTTF7A	NO1 TRANSFORMER 22KV CB BAY	CB-ETA2835	Live Tank 33kV 40kA	$184,887	$508,422	No	2023/24
NTSTTF7F2	NO3 (TIMBARRA MINE) 22KV CB BAY	CB-ETA2875	Live Tank 33kV 40kA	$184,887	$212,099	No	2024/25
NTSTTF7G2	NO4 (TSC 22/11KV SS) 22KV CB BAY	CB-ETA2876	Live Tank 33kV 40kA	$184,887	$194,444	No	2025/26
NTSTTF7K2	NO6 (TENTERFIELD TOWN) 22KV CB BAY	CB-ETA2761	Live Tank 33kV 40kA	$184,887	$216,457	No	2023/24
SWSALB2J	NO2-3 132KV BUS SECTION	CB-ETA1598 CT-EC00024682 CT-EC00024683	Dead Tank 132kV 40kA	$333,856	$10,205,163	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00024684					
SWSBKH3C2	X2 BURONGA 220KV NO.1 REACTOR BAY	CB-EC00014814	Live Tank 220kV 50kA POW	$480,818	$1,152,990	No	2023/24
SWSBKH3C3	X2 BURONGA 220KV NO.2 REACTOR BAY	CB-EC00014805	Live Tank 220kV 50kA POW	$480,818	$1,531,005	No	2023/24
SWSBKH3E2	X4 BROKEN HILL MINES 220KV CB BAY	CB-EC00014803	Live Tank 220kV 50kA	$430,352	$100,973,770	Yes	2023/24
SWSBRG3C2	X2 BROKEN HILL 220KV CB BAY	CB-EC00014806	Live Tank 220kV 50kA	$430,352	$115,877,460	Yes	2023/24
SWSBRG3C3	X2 BROKEN HILL 220KV REACTOR BAY	CB-EC00014810	Live Tank 220kV 50kA POW	$480,818	$1,839,159	No	2023/24
SWSBRG3D1	X3 BALRANDALD 220KV CB BAY	CB-EC00014808	Live Tank 330kV 50kA	$430,352	$2,088,329	No	2023/24
SWSBRG3G1	0X1 RED CLIFFS 220KV CB BAY	CB-EC00014809	Live Tank 330kV 50kA	$430,352	$1,233,210	No	2023/24
SWSDN22E	99L COLEAMBALLY 132 - 132KV FEEDER	CB-EC00013841	Live Tank 132kV 40kA	$211,394	$4,979,575	Yes	2023/24
SWSDNT2A	NO1 TRANSFORMER 132KV A BUS CB BAY	CB-EC00013851 CT-EC00013932 CT-EC00013931 CT-EC00013937	Dead Tank 132kV 40kA	$333,856	$3,033,687	Yes	2023/24
SWSDNT2B	NO2 TRANSFORMER 132KV B BUS CB BAY	CB-EC00013850 CT-EC00013928 CT-EC00013916 CT-EC00013920	Dead Tank 132kV 40kA	$333,856	$3,264,513	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
SWSDNT2D	99T/1 COLEAMBALLY 132KV FEEDER	CB-EC00013835 CT-EC00013915 CT-EC00013917 CT-EC00013925	Dead Tank 132kV 40kA	$333,856	$5,233,555	Yes	2023/24
SWSDNT2E1	99R HAY CB BAY	CB-EC00006571	Live Tank 132kV 40kA	$211,394	$2,814,767	Yes	2023/24
SWSDNT2F	99K GRIFFITH 132KV FEEDER	CB-EC00006570 CT-EC00005857 CT-EC00005854 CT-EC00005858	Dead Tank 132kV 40kA	$333,856	$5,268,241	Yes	2023/24
SWSFNY1A1	NO1 TRANSFORMER 132KV CB BAY	CB-EC00020413 CT-EC00020909 CT-EC00020901 CT-EC00020902	Dead Tank 132kV 40kA	$333,856	$3,121,258	No	2023/24
SWSFNY2F	84B FINLEY 66KV FEEDER	CB-EC00019187 CT-EC00017016 CT-EC00017028 CT-EC00017024	Dead Tank 66kV 40kA	$328,264	$418,264	No	2023/24
SWSGRF2B1	NO2 TRANSFORMER 132KV CB BAY	CB-EC00020422	Live Tank 132kV 40kA	$211,394	$3,704,365	Yes	2023/24
SWSGRF6K	79F YENDA 33KV FEEDER	CB-ETA1754 CT-ETA2498 CT-ETA2496 CT-ETA2497	Dead Tank 33kV 40kA	$328,264	$1,643,240	Yes	2023/24
SWSGRF6Q	79L BEELBANGERA 33KV FEEDER	CB-ETA1929 CT-ETA1886	Dead Tank 33kV 40kA	$328,264	$5,715,973	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-ETA1885 CT-ETA1876					
SWSGRF6U	79R THARBOGANG 33KV BAY	CB-ETA1930 CT-ETA5589 CT-ETA1887 CT-ETA1889	Dead Tank 33kV 40kA	$328,264	$5,678,611	Yes	2023/24
SWSGRF6V	NO2-3 33KV BUS SECTION	CB-ETA2495 CT-ETA1891 CT-ETA1890 CT-ETA1892	Dead Tank 33kV 40kA	$328,264	$5,388,443	Yes	2023/24
SWSGRF6X	79U GRIFFITH ZONE DUTY 33KV BAY	CB-ETA1755 CT-ETA1873 CT-ETA1872 CT-ETA1874	Dead Tank 33kV 40kA	$328,264	$498,758	Yes	2023/24
SWSMUR1GA	M13 Murray2 330kV A Bus CB Bay(Un.13-14)	CB-TG008705	Live Tank 330kV 50kA	$430,352	$265,142	No	2025/26
SWSMUR1GB	M13 Murray2 330kV B Bus CB Bay(Un.13-14)	CB-TG008701	Live Tank 330kV 50kA	$430,352	$341,695	No	2023/24
SWSMUR1LA	M1 Murray1 330kV A Bus CB Bay(Units 1-2)	CB-TG013518	Live Tank 330kV 50kA	$430,352	$296,161	No	2025/26
SWSMUR1MB	M3 Murray1 330kV B Bus CB Bay(Units 3-4)	CB-TG013517	Live Tank 330kV 50kA	$430,352	$268,542	No	2024/25
SWSMUR1NB	M5 Murray1 330kV B Bus CB Bay(Units 5-6)	CB-TG008703	Live Tank 330kV 50kA	$430,352	$676,564	Yes	2023/24
SWSMUR1PA	M7 Murray1 330kV A Bus CB Bay(Units 7-8)	CB-TG013519	Live Tank 330kV 50kA	$430,352	$502,257	Yes	2023/24
SWSWG12N	132KV "A" BUS SECTION 1-2	CB-EC00013852	Dead Tank	$333,856	$1,484,278	Yes	2023/24

Bay	Bay Description	PIC	OFS Estimate	Capex	NPV (weighted)	ALARP	Optimal Timing
		CT-EC00013941 CT-EC00013942 CT-EC00013943	132kV 40kA				
SWSWG24AN	NO.3 66KV CAPACITOR	CB-ETA2909	Live Tank 66kV 40kA POW	$251,453	$302,573	No	2023/24
SYSMNY2A1	NO1 TRANSFORMER 132KV CB BAY	CB-EC00013855	Live Tank 132kV 40kA	$211,394	$1,354,445	No	2023/24
SYSMNY2B1	NO2 TRANSFORMER 132KV CB BAY	CB-EC00013858	Live Tank 132kV 40kA	$211,394	$1,357,209	No	2023/24
SYSMNY2E	97K COOMA TEE 132KV FEEDER	CB-EC00013854	Live Tank 132kV 40kA	$211,394	$1,455,974	No	2023/24
SYSMRN2G	972 GOULBURN 132KV FEEDER	CB-EC00020424 CT-EC00020954 CT-EC00020951 CT-EC00020952	Dead Tank 132kV 40kA	$333,856	$8,944,637	Yes	2023/24
SYSMRN2J	98C FAIRFAX LANE 132KV FEEDER	CB-EC00020425 CT-EC00020950 CT-EC00020953 CT-EC00020957	Dead Tank 132kV 40kA	$333,856	$11,281,310	Yes	2023/24