OPTIONS EVALUATION REPORT (OER)

FY24-28 Building Refurbishment

OER- N2553 revision

Ellipse project no(s):
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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
0	29/09/2021	First Issue

Executive summary

Operational buildings are utilised at the majority of TransGrid's sites for the purposes of housing and protecting network elements from the environment, and providing a safe work environment for day to day operations.

Dilapidation reports prepared by Nutbrook Engineering have identified recommended works across various TransGrid sites to ensure buildings remain fit for purpose and continue to maintain a safe working environment for personnel attending sites. The dilapidation reports indicate that 154 network sites have building assets that are nearing end of life and are expected to be addressed in the short to medium term (within 6 years). It would be more cost effective to address these issues through a strategic and managed program of works, rather than remediation upon failure of the assets.

TransGrid is obligated to maintain safe working practices in accordance with a number of rules and regulations including the Work Health Safety Act 2011. As such there is a need to address deteriorating asset health and the associated safety risks of the identified building assets.

The assessment of the options considered to address the need/opportunity appears in Table 1.

Table 1 - Evaluated options

Option	Description	Direct capital cost ($m)	Overheads ($m)	Total capital cost[1] ($m)	Weighted NPV (PV, $m)	Rank
Option A – N2553A	Refurbish buildings – Renewal of building components at various sites	16.51	0.28	16.79	1.02	1

It is the recommendation that Option A – Refurbish buildings be scoped in detail.

Option A is the only technically and commercially feasible option identified and its commercial evaluation results in a positive NPV. Moreover, this option will enable TransGrid to meet its obligations in work health and safety for personnel however further benefits associated with safety outcomes are expected which are currently not considered in NPV analysis.

[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

Operational buildings are utilised at the majority of TransGrid's sites for the purposes of housing and protecting critical network assets from the physical environment, and providing a safe work environment for staff performing activities on those assets.

Over a protracted period TransGrid has prioritised investment in other network assets ahead of buildings based on risk, cost and performance trade-off. This has meant network building assets have been subject to under investment in refurbishment works. Defect analysis has uncovered an increasing prevalence of damaged components including roof leaks, doors, windows and tile damage, the majority of which cannot be addressed through preventative maintenance. Moreover, dilapidation reports prepared by Nutbrook Engineering have recommended works to ensure buildings remain fit for purpose and maintain safe working conditions for personnel attending site. The dilapidation reports indicate that 154 network sites have building asset issues that are expected to be addressed in the short to medium term (within 6 years). Repairing or replacing these assets under an emergency, after they have functionally failed, is likely to cost significantly more compared to planned remediation. For this reason it would be cost effective to address these issues through a planned program or works.

There is a need to address safety implications associated with the identified building assets to meet our responsibilities under the Work Health Safety Act 2011 as a Person Conducting a Business or Undertaking (PCBU), and various government regulations and Australian Standards.

In accordance with TransGrid's Renewal and Maintenance Strategy for Network Property, a refurbishment program is required to effectively manage known and emerging issues within the network.

Defective or failed building components can adversely affect the health and safety of staff working on site, for example:

- Damaged floors can present a slip, trip, and fall hazard.
- Asbestos containing materials can become more unstable as a result of building deterioration.
- Inadequate lighting can hinder staff from working safely.
- Roof damage leads to water ingress and potential structural rotting, mould growth and accelerated deterioration.

In addition to the safety implications, structural issues in buildings also pose an operational and financial risk. If unaddressed, structural failure of a building (e.g. roof collapse) could result in the equipment installed inside being damaged, compromising the operation of the network.

The current estimate of the required scope of refurbishment works between 2023/24 and 2027/28 involves approximately 300 operational buildings spread across 154 sites.

2. Related needs/opportunities

- Need N2536 – FY24-28 Physical Security Renewals
- Need N2563 – FY24-28 Palisade Renewal
- Need N2482 – FY24-28 Fire Systems (Electronic) Renewal
- Need N2560 – FY24-28 Fire Systems (Mechanical) Renewal
- Need N2546 – FY24-28 Fire Extinguisher Renewal

3. Options

3.1 Base case

The Base Case for this Need is to continue with TransGrid's business as usual operations and maintenance (O&M) for operational buildings. This approach does not address the following issues:

- Increasing risk of failure of building assets that have reached (or are nearing) end of life (as identified by Nutbrook Engineering). Repairing or replacing these assets under emergency after they have functionally failed is likely to cost significantly more than planned remediation due to the need to expedite works to bring the assets back into service as soon as possible. Moreover, planned asset replacement allows more efficient repair of assets as multiple repairs can be competed simultaneously at each site.
- Safety risk for personnel in the event of structural failure of the building components.
- Risk of secondary systems equipment damage as a result of structural failure of building components such as roofing systems. Depending on the extent of building functional degradation, there is also a likelihood of operational impacts in situations where secondary equipment is damaged.
- Significant amount of defects for assets such as air conditioning resulting from suboptimal operating conditions (due to factors such as inadequate sealing of rooms or heat transfer through windows). Subsequently, this may have an adverse impact on the life of assets within the building that need to operate within certain temperature ranges.

3.2 Options evaluated

Option A — Refurbish Buildings [NOSA N2553, OFS N2553A]

This option involves refurbishing operational buildings at various network sites across TransGrid (refer to Appendix C for complete list of sites). The scope involves renewal of components related to the buildings and items within (but may also include work external to the building). Additional works associated with operational rooms in the buildings is also included (e.g. resealing doors, disabling and blacking out windows).

Refer to Appendix B for details on the scope of work.

This option will deliver reduced costs to the consumers by achieving the following:

- Minimising costs to remediate the identified building issues in a planned manner.
- Avoid the risk of damage and/or failure of operational equipment housed in the buildings.
- Reduction in air conditioning defects through improving thermal conditions of operational rooms (and hence maximising the life of the equipment within).

Moreover, this option will reduce the safety risk to personnel associated with building assets failure and therefore meet our work and safety obligations.

It is anticipated that the works will commence in 2024/25 and completed in 2027/28.

3.3 Options considered and not progressed

Table 2 - Option considered but not progressed

Option	Reason for not progressing
Asset Retirement	This can only be achieved through retirement of buildings at all identified sites, which is not technically or commercially feasible.
Establish new buildings	This option is not commercially feasible unless there is extensive damage to the building that cannot be repaired or refurbished. Through reviewing dilapidation reports, this has not been identified at any sites.

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 - Scenarios

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 benefit	100%	75%	125%
Scenario weighting	**50%**	**25%**	**25%**

Parameters used in this commercial evaluation:

Table 4 - Parameters used in commercial evaluation

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.	30 years
Safety disproportionality	Multiplier of the safety risk cost included in NPV analysis to demonstrate implementation of obligation to reduce safety 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 and commercially feasible options is set out in Table 5. Details appear in Appendix A.

Table 5 - Commercial evaluation (PV, $ million)

Option	Capital Cost PV	Central scenario NPV	Lower bound scenario NPV	Higher bound scenario NPV	Weighted NPV	Ranking
Option A	13.32	0.44	-6.10	9.29	1.02	1

Note: The evaluation above is a consolidation of building renewal items that have been individually evaluated as NPV positive. A summary of the evaluation on the site basis is included in Appendix C.

The evaluation focuses on the cost benefits achieved by refurbishing the identified building assets in a planned manner, rather than repairing the assets after failure at an escalated cost. The safety risk associated with failure of the building assets as well as the risk of damage to other assets have not been quantified. Due to the varying nature of the issues and variations in the arrangement of assets within the affected buildings, the risk for each building issue to be addressed (approximately 700 in total) would need to be assessed on a case by case basis. Hence, it is impractical to quantify these risks for inclusion in this evaluation. However, addressing this Need would deliver additional benefits by minimising these unquantified risks.

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. Although a network safety risk reduction is expected through addressing this need, the safety and bushfire risks have not been quantified. Hence, an ALARP evaluation is not applicable in this case.

4.4 Preferred option

The preferred option to meet the identified need by 2027/28 is Option A. Option A is the only technically and economically feasible option identified and its commercial evaluation has resulted in a positive NPV.

Option A involves refurbishing operational buildings at various sites across TransGrid to address components that are expected to fail in the short to medium term. It would be more cost effective to address these issues through a strategic and managed program of works, rather than remediation upon failure of the assets. Moreover, this option will reduce the safety risk to personnel associated with building assets failure and therefore meet our work and safety obligations.

Capital and Operating Expenditure

There is negligible difference in predicted ongoing planned routine operational expenditure between the option and the Base Case. However, there is a cost trade-off between repairing/refurbishing the building assets under a planned capital program and remediation upon asset failure. Generally, the cost required to repair failed building assets (as in the Base Case) under corrective works is likely to be significantly greater than refurbishing the assets prior to failure (as in the preferred option) as a significant portion of assets identified are expected to fail in the short to medium term, that is, in under 6 years.

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

The results of optimal timing analysis is:

- Optimal commissioning year: 2027/28
- Commissioning year annual benefit: $5.39 million
- Annualised cost: $0.95 million

Based on the optimal timing, the project is expected to commence in the 2023/24-2027/28 Regulatory Period.

6. Recommendation

It is the recommendation that Option A – Refurbish Buildings be scoped in detail.

The total project cost is $16.79 million including an amount of $293,000 to progress the project from DG1 to DG2.

Appendix A – Option Summaries

Project Description	FY24-28 Building Refurbishment		
Option Description	Option A - Refurbish Buildings		
Project Summary			
Option Rank	*1*	Investment Assessment Period	*30*
Asset Life	*40*	NPV Year	2020/21
Economic Evaluation			
NPV @ Central Benefit Scenario (PV, $m)	0.44	Annualised CAPEX @ Central Benefit Scenario ($m)	Annualised Capex - Standard (Business Case) 0.95
NPV @ Lower Bound Scenario (PV, $m)	-6.10	Network Safety Risk Reduction ($m)	Network Safety Risk Reduction 0.00
NPV @ Higher Bound Scenario (PV, $m)	9.29	ALARP	ALARP Compliant? No
NPV Weighted (PV, $m)	1.02	Optimal Timing	Optimal timing (Business Case) 2023/24
Cost (Central Scenario)			
Total Capex ($m)	16.79	Cost Capex (PV,$m)	13.32
Terminal Value ($m)	3.78	Terminal Value (PV,$m)	0.67
Risk (Central Scenario)	**Pre**	**Post**	**Benefit**
Reliability (PV,$m)	Reliability Risk (Pre) 0.00	Reliability Risk (Post) 0.00	Pre – Post 0.00
Financial (PV,$m)	Financial Risk (Pre) 0.00	Financial Risk (Post) 0.00	Pre – Post 0.00
Operational/Compliance (PV,$m)	Operational Risk (Pre) 0.00	Operational Risk (Post) 0.00	Pre – Post 0.00
Safety (PV,$m)	Safety Risk (Pre) 0.00	Safety Risk (Post) 0.00	Pre – Post 0.00
Environmental (PV,$m)	Environmental Risk (Pre) 0.00	Environmental Risk (Post) 0.00	Pre – Post 0.00
Reputational ($m)	Reputational Risk (Pre) 0.00	Reputational Risk (Post) 0.00	Pre – Post 0.00
Total Risk (PV,$m)	Total Risk (Pre) 0.00	Total Risk (Post) 0.00	Pre – Post 0.00
OPEX Benefit (PV,$m)			OPEX Benefit 0.00
Other benefit (PV,$m)			Incremental Net Benefit 13.09
Total Benefit (PV,$m)			Business Case Total Benefit 13.09

Appendix B – Scope of Works

The scope mainly requires renewal of components related to the buildings and items within (but may also include work external to the building). The items to be addressed are listed in "RP3 Network Property Renewal Items" spreadsheet attached in the supporting documents in PDGS. Note that only short and medium term actions are to be addressed (all within RP3). Long term actions are only included for reference and are not within the scope of this Need.

Only items associated with the following asset types are to be progressed in the renewal program:

- Computer Room Air Conditioning (CRAC) Units
- Fascia & Soffits
- Foundation
- Generator
- Internal Drainage
- Kerbing & Gutters
- Mechanical Services Switch Board (MSSB)
- Other Hydraulic Items
- Power Distribution
- Rainwater tanks
- Retaining Wall
- Roof - Safe Access
- Roof Fixtures
- Roofing Systems
- Skylights
- Stormwater Drains

Additionally, thermal conditions will be improved within operational (switching, control, and communications) rooms in targeted buildings via the following works:

- Resealing of doors
- Disabling any windows that can be opened
- Blacking out of all windows

Refer to Appendix C for the list of sites requiring renewal works.

Appendix C – Sites Requiring Renewal Works

Listed below are the 154 network sites with building issues that are to be addressed in this Need.

Refer to Appendix B for the scope of work applicable at these sites.

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
ALB	Albury	Substation	$253,740	$37,922	N/A	2023/24
ANM	Aust Newsprint Mills	Substation	$215,439	$31,571	N/A	2023/24
AR1	Armidale	Substation	$339,749	$49,787	N/A	2023/24
AVS	Avon	Substation	$329,925	$48,348	N/A	2023/24
BAD	Baldy Peak	Radio Repeater Site	$65,122	$9,543	N/A	2023/24
BBY	Bannaby	Substation	$80,011	$11,725	N/A	2023/24
BER	Beryl	Substation	$161,260	$29,358	N/A	2023/24
BFD	Beaconsfield	Substation	$90,448	$13,590	N/A	2023/24
BGP	Bugong Gap	Radio Repeater Site	$37,988	$6,574	N/A	2023/24
BGR	Mount Bingar	Radio Repeater Site	$7,815	$1,145	N/A	2023/24
BHD	Bulls Head Mountain	Radio Repeater Site	$13,122	$1,923	N/A	2023/24
BKH	Broken Hill	Substation	$249,165	$36,513	N/A	2023/24
BLD	Ben Lomond	Radio Repeater Site	$18,090	$3,155	N/A	2023/24
BNE	Boyne	Radio Repeater Site	$14,110	$2,068	N/A	2023/24
BOA	Boambee	Radio Repeater Site	$58,206	$8,530	N/A	2023/24
BOS	South Boambee	Switching Station	$4,522	$831	N/A	2023/24
BOT	Botobalar	Radio Repeater Site	$55,243	$8,095	N/A	2023/24
BRA	Mt Burra	Radio Repeater Site	$99,729	$15,011	N/A	2023/24
BRD	Balranald	Switching Station	$41,063	$6,017	N/A	2023/24
BRG	Buronga	Substation	$108,679	$15,926	N/A	2023/24
BYB	Banyabba	Radio Repeater Site	$3,089	$453	N/A	2023/24
CA1	Canberra	Substation	$61,365	$9,390	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
CAR	Carlingford	Radio Repeater Site	$62,395	$9,143	N/A	2023/24
CBT	Cabbage Tree	Radio Repeater Site	$74,828	$10,965	N/A	2023/24
CCK	Clouds Creek	Radio Repeater Site	$95,898	$14,254	N/A	2023/24
CLH	Clarkes Hill	Radio Repeater Site	$36,944	$5,414	N/A	2023/24
CLY	Coleambally	Substation	$30,571	$4,561	N/A	2023/24
CMB	Coleambally	Radio Repeater Site	$61,143	$8,960	N/A	2023/24
COA	Cooma	Substation	$2,713	$498	N/A	2023/24
COF	Coffs Harbour	Substation	$258,788	$37,923	N/A	2023/24
CON	Conargo	Radio Repeater Site	$61,504	$9,013	N/A	2023/24
CW2	Cowra	Substation	$105,824	$18,329	N/A	2023/24
DFT	Darkes Forest	Radio Repeater Site	$17,081	$2,503	N/A	2023/24
DMQ	Dumaresq	Switching Station	$5,427	$795	N/A	2023/24
DN2	Deniliquin	Substation	$83,128	$12,621	N/A	2023/24
DNT	Darlington Point	Substation	$411,453	$60,799	N/A	2023/24
DPT	Dapto	Substation	$678,356	$99,407	N/A	2023/24
ELD	Elderslie	Radio Repeater Site	$25,277	$4,471	N/A	2023/24
ELS	Ellsmore	Radio Repeater Site	$40,107	$5,877	N/A	2023/24
EMH	Emerald Hill	Radio Repeater Site	$19,690	$2,945	N/A	2023/24
EMV	Emmaville	Radio Repeater Site	$12,941	$1,896	N/A	2023/24
ER0	Eraring	Substation	$20,260	$3,285	N/A	2023/24
FB2	Forbes	Substation	$68,885	$10,094	N/A	2023/24
FIL	Finley	Radio Repeater Site	$78,557	$11,960	N/A	2023/24
FNY	Finley	Substation	$113,853	$18,836	N/A	2023/24
GAD	Gadara	Substation	$307,522	$55,140	N/A	2023/24
GLG	Gulong	Radio Repeater Site	$1,447	$266	N/A	2023/24
GLR	Glenrock	Radio Repeater Site	$27,315	$4,003	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
GN2	Gunnedah	Substation	$46,928	$6,877	N/A	2023/24
GNS	Glen Innes	Substation	$10,373	$1,520	N/A	2023/24
GOO	Goombargana	Radio Repeater Site	$8,001	$1,172	N/A	2023/24
GRD	Girard	Radio Repeater Site	$1,809	$332	N/A	2023/24
GRF	Griffith Substation	Substation	$251,514	$37,865	N/A	2023/24
GTH	Guthega	Switching Station	$7,778	$1,140	N/A	2023/24
GUL	Gullen Range	Radio Repeater Site	$2,713	$398	N/A	2023/24
HHR	Hammond Hill	Radio Repeater Site	$1,447	$212	N/A	2023/24
HIR	High Range	Radio Repeater Site	$26,230	$3,844	N/A	2023/24
HLD	Holroyd	Substation	$2,713	$498	N/A	2023/24
HRS	Hay	Radio Repeater Site	$18,090	$2,920	N/A	2023/24
HTG	Hallam Trig	Radio Repeater Site	$543	$100	N/A	2023/24
HU2	Lake Hume Village	Substation	$904	$133	N/A	2023/24
HYM	Haymarket	Substation	$40,910	$6,029	N/A	2023/24
ING	Ingleburn	Substation	$230,885	$34,338	N/A	2023/24
INV	Inverell	Substation	$132,499	$19,417	N/A	2023/24
JDA	Jindera	Substation	$328,394	$48,627	N/A	2023/24
KCR	Kemps Creek	Substation	$407,014	$60,148	N/A	2023/24
KJG	Kurrajong	Radio Repeater Site	$27,726	$4,126	N/A	2023/24
KLK	Koolkhan	Substation	$29,450	$4,316	N/A	2023/24
KS2	Kempsey	Substation	$93,161	$13,652	N/A	2023/24
KVS	Kangaroo Valley	Substation	$252,209	$38,168	N/A	2023/24
LD1	Liddell	Substation	$348,988	$51,141	N/A	2023/24
LDA	Lerida	Radio Repeater Site	$39,519	$5,791	N/A	2023/24
LOK	Loka	Radio Repeater Site	$71,259	$10,442	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
LP1	Liverpool	Substation	$303,081	$45,421	N/A	2023/24
LSM	Lismore	Substation	$281,216	$41,420	N/A	2023/24
LT1	Lower Tumut	Switching Station	$571,907	$83,808	N/A	2023/24
MAC	Menangle	Substation	$31,239	$4,645	N/A	2023/24
MAS	Mary Ann Street	Substation	$108,537	$15,905	N/A	2023/24
MAT	Mt Arthur	Radio Repeater Site	$49,475	$7,250	N/A	2023/24
MBH	Murrumburrah	Radio Repeater Site	$1,447	$212	N/A	2023/24
MBR	Mt Berrico	Radio Repeater Site	$904	$133	N/A	2023/24
MCA	Mt Coramba	Radio Repeater Site	$60,148	$8,814	N/A	2023/24
MCN	Mt Canobolas	Radio Repeater Site	$31,970	$4,685	N/A	2023/24
MCR	Mt Crawney	Radio Repeater Site	$59,681	$8,746	N/A	2023/24
MDS	Mt Douglas	Radio Repeater Site	$8,140	$1,193	N/A	2023/24
MGY	Mt Grey	Radio Repeater Site	$35,101	$5,144	N/A	2023/24
MID	Middle Brother	Radio Repeater Site	$47,381	$6,943	N/A	2023/24
MKR	Mt Kaputar	Radio Repeater Site	$35,762	$5,241	N/A	2023/24
MLB	Mt Lambie	Radio Repeater Site	$12,663	$2,326	N/A	2023/24
MLG	Mallanganee	Radio Repeater Site	$31,726	$4,649	N/A	2023/24
MMQ	Mt Macquarie	Radio Repeater Site	$2,894	$424	N/A	2023/24
MN1	Munmorah	Substation	$160,092	$23,460	N/A	2023/24
MNY	Munyang	Substation	$108,171	$16,712	N/A	2023/24
MOL	Molong	Switching Station	$36,903	$5,408	N/A	2023/24
MRE	Moree	Substation	$572,533	$92,061	N/A	2023/24
MRK	Muswellbrook	Substation	$171,850	$25,183	N/A	2023/24
MRN	Marulan	Substation	$273,778	$40,321	N/A	2023/24
MRU	Murrumburrah	Radio Repeater Site	$356,363	$52,659	N/A	2023/24
MSG	Mt Spring	Radio Repeater Site	$10,854	$1,591	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
MTP	Mt Piper	Substation	$352,502	$52,923	N/A	2023/24
MUR	Murray	Substation	$62,527	$9,163	N/A	2023/24
MVL	Macksville	Switching Station	$4,522	$831	N/A	2023/24
NAM	Nambucca	Substation	$54,616	$8,104	N/A	2023/24
NB2	Narrabri	Substation	$173,334	$26,066	N/A	2023/24
NER	Nerriga	Radio Repeater Site	$8,140	$1,193	N/A	2023/24
NEW	Newcastle	Substation	$353,441	$51,995	N/A	2023/24
ONO	Orange North	Substation	$11,236	$1,747	N/A	2023/24
ORG	Orange	Substation	$154,582	$24,055	N/A	2023/24
PAN	Parrots Nest	Radio Repeater Site	$8,899	$1,438	N/A	2023/24
PKS	Parkes	Substation	$171,071	$25,069	N/A	2023/24
PMA	Panorama	Substation	$326,585	$47,858	N/A	2023/24
PMQ	Port Macquarie	Substation	$10,492	$1,605	N/A	2023/24
PTL	Point Lookout	Radio Repeater Site	$32,909	$4,823	N/A	2023/24
PUT	Putty Rock	Radio Repeater Site	$7,236	$1,060	N/A	2023/24
RAL	Rayleigh	Switching Station	$4,522	$831	N/A	2023/24
RAZ	Razorback	Radio Repeater Site	$50,442	$7,392	N/A	2023/24
RGV	Regentville	Substation	$62,652	$9,627	N/A	2023/24
RLP	Roches Loop	Radio Repeater Site	$904	$133	N/A	2023/24
RRT	Robertson	Radio Repeater Site	$45,419	$6,656	N/A	2023/24
RWR	Rookwood	Substation	$11,396	$1,670	N/A	2023/24
SBP	Saddleback	Radio Repeater Site	$10,422	$1,914	N/A	2023/24
SCK	Simpkins Creek	Radio Repeater Site	$7,305	$1,308	N/A	2023/24
SDE	Sydney East	Radio Repeater Site	$100,397	$14,712	N/A	2023/24
SE1	Sydney East	Substation	$377,799	$55,363	N/A	2023/24
SNB	Snubba	Radio Repeater Site	$109,080	$15,985	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
SOM	Somersby	Radio Repeater Site	$26,098	$4,127	N/A	2023/24
SQH	Square Head	Radio Repeater Site	$69,158	$11,359	N/A	2023/24
SRH	Shooters Hill	Radio Repeater Site	$19,645	$2,879	N/A	2023/24
SUG	Mt Sugarloaf Rd	Radio Repeater Site	$44,577	$6,532	N/A	2023/24
SPK	Sydney Park	Substation	$129,340	$18,954	N/A	2023/24
SYN	Sydney North	Substation	$16,002	$2,345	N/A	2023/24
SYW	Sydney West	Substation	$137,480	$20,147	N/A	2023/24
TA1	Tamworth	Substation	$265,916	$38,968	N/A	2023/24
TAO	Talmo	Radio Repeater Site	$62,381	$9,141	N/A	2023/24
TGH	Tuggerah	Substation	$194,462	$28,497	N/A	2023/24
TRE	Taree	Substation	$4,016	$637	N/A	2023/24
TTF	Tenterfield	Substation	$60,224	$8,825	N/A	2023/24
URQ	Uranquinty	Switching Station	$7,932	$1,297	N/A	2023/24
UT1	Upper Tumut	Switching Station	$9,316	$1,365	N/A	2023/24
VP1	Vales Point	Substation	$69,509	$10,186	N/A	2023/24
VYD	Vineyard	Substation	$81,667	$14,406	N/A	2023/24
WDL	Williamsdale	Substation	$7,904	$1,212	N/A	2023/24
WEB	Wereboldera	Radio Repeater Site	$9,678	$1,418	N/A	2023/24
WG1	Wagga Wagga	Substation	$282,196	$43,301	N/A	2023/24
WG2	Wagga Wagga	Substation	$187,505	$27,477	N/A	2023/24
WID	Widgelli	Radio Repeater Site	$10,854	$1,994	N/A	2023/24
WLR	Wollar	Radio Repeater Site	$2,713	$398	N/A	2023/24
WOR	Wollar	Substation	$22,687	$3,325	N/A	2023/24
WRH	Waratah	Substation	$148,099	$21,703	N/A	2023/24
WW1	Wallerawang 330kV	Substation	$196,174	$28,748	N/A	2023/24
WWS	Wallerawang	Substation	$10,659	$1,562	N/A	2023/24

Site Code	Site Name	Site Type	Cost	Weight NPV	ALARP	Optimal Timing
	132kV					
YA2	Yanco	Substation	$20,733	$3,038	N/A	2023/24
YSN	Yass	Substation	$221,951	$32,794	N/A	2023/24
YSR	Yass	Radio Repeater Site	$57,886	$8,483	N/A	2023/24