

REF Decision Statement

Sydney West 330 kV Substation – New No. 6 Transformer Installation

Transgrid is the proponent for the *Sydney West 330 kV Substation – New No. 6 Transformer Installation* project. The proposed activity involves the installation of a new 330/132 kV transformer (No. 6) within the substation's switchyard along with other high voltage infrastructure including and two 132 kV switchbays. To enable this, the existing No. 7 330 kV capacitor bank would need to be relocated onto an extended bench along with additional high voltage equipment and one new 330 kV switchbay. The proposed activity also involves construction of a new temporary access road, drainage works and vegetation removal. All proposed works are located within Transgrid's Sydney West 330 kV Substation property boundary (Lot 22 DP1246626).

A Review of Environmental Factors (REF) was prepared in June 2026 by Transgrid to assess the potential impacts of the proposed activity.

The REF has been prepared in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *Environmental Planning and Assessment Regulation 2021* (EP&A Regulation) and the Guidelines for Division 5.1 Guidelines approved under section 170 of the EP&A Regulation.

In considering the proposed activity, Transgrid has examined and taken into account matters affecting or likely to affect the environment by reason of that activity, as addressed in the REF.

As an authorised person on behalf of Transgrid, I discharge the duty as a determining authority under Division 5.1 of the EP&A Act and determine that:

- the proposed activity is not likely to have a significant impact on the environment and therefore an Environmental Impact Statement (EIS) is not required
- the proposed activity will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats or impact biodiversity values, meaning a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required
- the proposed activity may proceed as it is needed to provide increased supply capacity to the Sydney West area, enabling it to meet projected demand and connection point reliability obligations.
- mitigation measures are required to eliminate, minimise or manage environmental impacts as documented in Appendix C of the REF.
- the proposed activity is not likely to have a significant impact on matters of national environmental significance, or on the environment of Commonwealth land, and therefore referral to the Minister under the EPBC Act is not required.

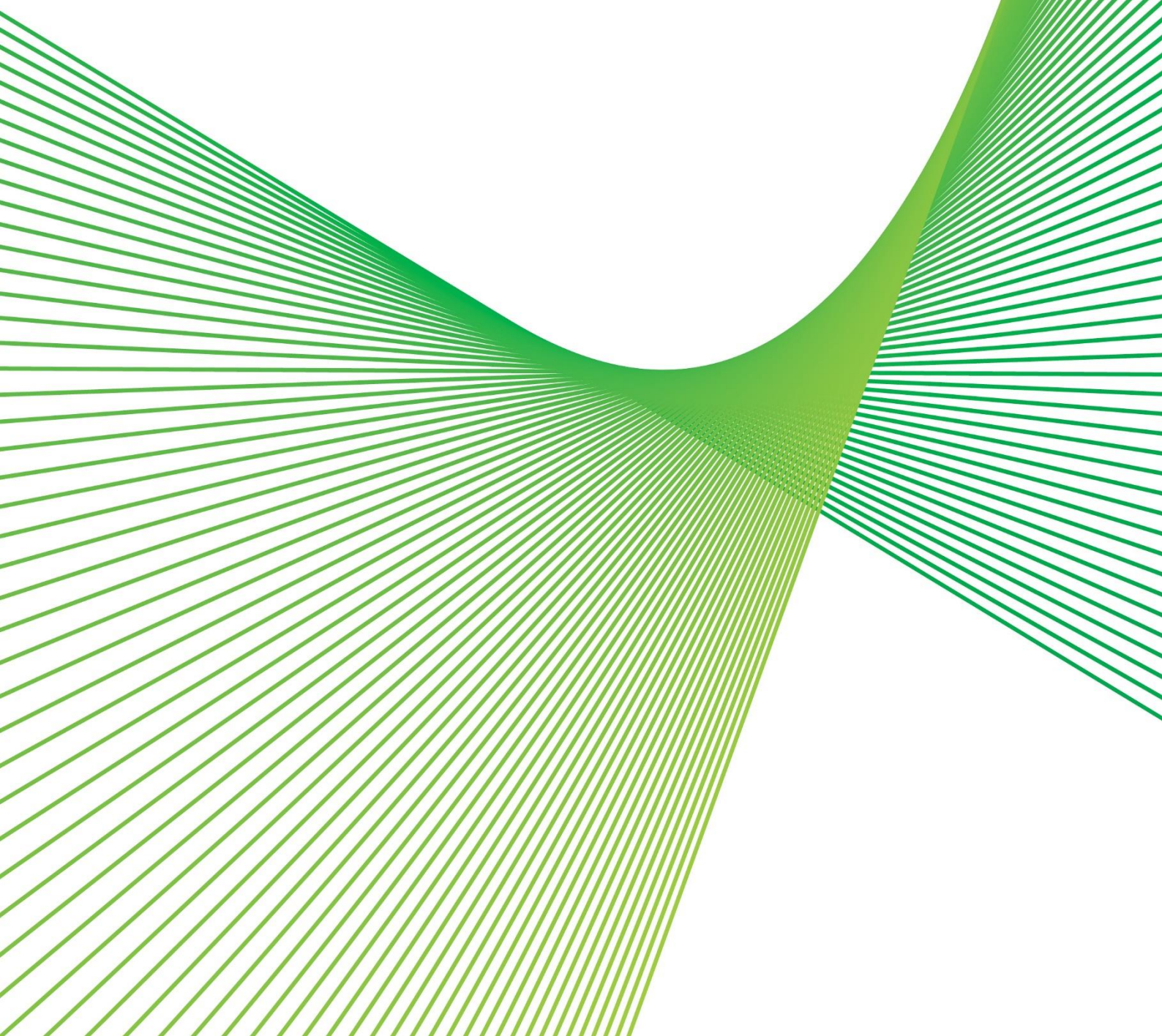
[REDACTED]

Monika Moutos
General Manager, Environmental Strategy and Planning
Transgrid
Date: 17 June 2026

Review of Environmental Factors

Sydney West 330 kV Substation – New No. 6 Transformer Installation

June 2026



Certification


REF preparer

I certify that I have prepared the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under section 170 of the EP&A Regulation and the information it contains is neither false nor misleading.

| | |
|---------------------|--|
| Name | Aeeshah Mohammed |
| Title | Environmental Planner |
| Company name | Transgrid |
| Signature |  |
| Date | 9 June 2026 |

REF reviewer/ endorser

I certify that I have reviewed and endorsed the contents of this REF document and, to the best of my knowledge, it is in accordance with the EP&A Act, the EP&A Regulation and the Guidelines approved under section 170 of the EP&A Regulation and the information it contains is neither false nor misleading.

| | |
|---------------------|--|
| Name | Ella Muema |
| Title | Environmental Planning Manager |
| Company name | Transgrid |
| Signature |  |
| Date | 9 June 2026 |

Contents

| | |
|--|-----------|
| 1. Introduction | 1 |
| 1.1. Proposed activity overview..... | 1 |
| 1.2. Purpose of the REF | 1 |
| 2. Need for the proposed activity | 2 |
| 2.1. Proposed activity need | 2 |
| 2.2. Alternative options considered and preferred option | 2 |
| 3. Proposed activity description..... | 3 |
| 3.1. Proposed activity scope | 3 |
| 3.2. Proposed activity location..... | 3 |
| 3.3. Construction activities | 6 |
| 3.3.1. Construction methodology..... | 6 |
| 3.3.2. Construction plant, material, and equipment | 8 |
| 3.3.3. Construction schedule | 2 |
| 3.3.4. Construction hours | 2 |
| 3.4. Operation and maintenance..... | 2 |
| 4. Statutory context..... | 10 |
| 4.1. Approvals pathway | 10 |
| 4.1.1. Environmental Planning and Assessment Act 1979 | 10 |
| 4.1.2. State Environmental Planning Policy (Transport and Infrastructure) 2021 | 10 |
| 4.2. Other relevant Commonwealth and NSW legislation..... | 10 |
| 5. Consultation | 14 |
| 5.1. Consultation undertaken to date | 14 |
| 5.1.1. Electricity Supply Act 1995..... | 14 |
| 5.1.2. State Environmental Planning Policy (Transport and Infrastructure) 2021 | 14 |
| 5.1.3. Community consultation | 14 |
| 5.1.4. Issues raised..... | 14 |
| 6. Environmental impact assessment..... | 16 |
| 6.1. Land use..... | 16 |
| 6.1.1. Existing environment | 16 |
| 6.1.2. Impact assessment..... | 16 |
| 6.2. Geology and soils..... | 16 |
| 6.2.1. Existing environment | 16 |

| | |
|---|-----------|
| 6.2.2. Impact assessment..... | 17 |
| 6.3. Hydrology and water quality..... | 18 |
| 6.3.1. Existing environment..... | 18 |
| 6.3.2. Impact assessment..... | 18 |
| 6.4. Ecology..... | 19 |
| 6.4.1. Existing environment..... | 19 |
| 6.4.2. Impact assessment..... | 21 |
| 6.5. Aboriginal heritage..... | 22 |
| 6.5.1. Existing environment..... | 22 |
| 6.5.2. Impact assessment..... | 22 |
| 6.6. Historic heritage..... | 22 |
| 6.6.1. Existing environment..... | 22 |
| 6.6.2. Impact assessment..... | 23 |
| 6.7. Noise and vibration..... | 23 |
| 6.7.1. Existing environment..... | 23 |
| 6.7.2. Impact assessment..... | 24 |
| 6.8. Traffic and access..... | 25 |
| 6.8.1. Existing environment..... | 25 |
| 6.8.2. Impact assessment..... | 25 |
| 6.9. Air quality..... | 26 |
| 6.9.1. Existing environment..... | 26 |
| 6.9.2. Impact assessment..... | 26 |
| 6.10. Hazards and risks..... | 26 |
| 6.10.1. Existing environment..... | 26 |
| 6.10.2. Impact assessment..... | 27 |
| 6.11. Visual amenity..... | 28 |
| 6.11.1. Existing environment..... | 28 |
| 6.11.2. Impact assessment..... | 28 |
| 6.12. Waste..... | 28 |
| 6.12.1. Existing environment..... | 28 |
| 6.12.2. Impact assessment..... | 29 |
| 6.13. Social and economic considerations..... | 30 |
| 6.13.1. Existing environment..... | 30 |
| 6.13.2. Impact assessment..... | 30 |
| 6.14. Cumulative impacts..... | 30 |
| 6.14.1. Existing environment..... | 30 |
| 6.14.2. Impact assessment..... | 31 |
| 7. Consideration of statutory factors..... | 34 |
| 7.1. Section 5.5 of the EP&A Act..... | 34 |

| | |
|---|-----------|
| 7.2. Section 171 of the EP&A Regulation | 34 |
| 7.3. Section 171A of the EP&A Regulation | 36 |
| 7.4. Matters of National Environmental Significance (MNES) under the EPBC Act..... | 37 |
| 7.5. Consideration of Ecologically Sustainable Development | 37 |
| 8. Environmental management | 39 |
| 9. Conclusion | 40 |
| 10. References | 41 |
| Appendix A Scope summary and Aboriginal heritage and ecological due diligence assessments .. | 42 |
| Appendix B Figure | 44 |
| Appendix C Mitigation measures | 48 |
| Appendix D Ecology Due Diligence Field Assessment | 53 |
| Appendix E Noise Impact Assessment..... | 54 |

1. Introduction

1.1. Proposed activity overview

The Sydney West 330 kV Substation (substation) forms an essential component of Transgrid's electricity supply in the New South Wales (NSW) Greater Sydney region. The proposed activity involves the installation of a new 330/132 kV transformer (No. 6) within the substation's switchyard along with other high voltage infrastructure and two 132 kV switchbays. To enable this, the existing No. 7 330 kV capacitor bank would need to be relocated onto an extended bench along with additional high voltage equipment and one new 330 kV switchbay. The proposed activity is wholly located within the substation property boundary.

1.2. Purpose of the REF

For the purposes of this activity, NSW Electricity Networks Operations Pty Ltd as a trustee for NSW Electricity Networks Operations Trust (known as Transgrid) is the proponent and the determining authority under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this REF is to assess the potential impacts of the proposed activity on the environment and to determine appropriate mitigation measures to reduce and manage those impacts. This REF has been prepared with consideration of the *Guidelines for Division 5.1 assessments*, section 171(1) of the Environmental Planning and Assessment Regulation 2021 (EP&A Regulation) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The REF helps fulfil the requirements of section 5.5 of the EP&A Act, namely that Transgrid examines and takes into account matters affecting or likely to affect the environment by reason of the proposed activity, in a manner that is proportionate to the nature and risk of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposed activity is likely to have a significant impact on the environment, in which case an environmental impact statement (EIS) is required
- Whether the proposed activity will be carried out in a declared area of outstanding biodiversity value and/or is likely to significantly affect threatened species, populations, ecological communities or their habitats, in which case a species impact statement (SIS) or biodiversity development assessment report (BDAR) is required.

2. Need for the proposed activity

2.1. Proposed activity need

The proposed activity is required as the risk of unserved energy emerges at Sydney West 330 kV Substation due to increasing summer demand exceeding capacity at the site, the connection of new data centres and ongoing development of commercial and industrial lands and associated infrastructure in the area. The additional 330/132 kV transformer at the Sydney West 330 kV Substation is required to ensure compliance by providing increased supply capacity to the Sydney West area, enabling it to meet projected demand and connection point reliability obligations.

2.2. Alternative options considered and preferred option

A number of alternative options were considered for the proposed activity (Table 2-1) with Option 2 identified as the preferred option.

Table 2-1 Alternative options considered and preferred option

| Option | Overview and justification | Preferred option |
|--|--|------------------|
| Option 1 - 'Do Nothing' | The 'Do Nothing' scenario presents a case where there is no consideration for installation of a new 330/132 kV transformer at Sydney West 330 kV Substation/BSP. Under this option, demand would be unable to be met and Transgrid would be at risk of non-compliance with the National Electricity Market (NEM). | No |
| Option 2 – New 330/132 kV transformer at Sydney West Substation | This option would require the installation of a new 330/132 kV transformer at the existing Sydney West 330 kV Substation/BSP. This option was deemed to be the preferred option. | Yes |
| Option 3 – New 330/132 kV BSP at Endeavour Energy's Mt Druitt Substation | This option would require the establishment of a new 330/132 kV BSP at the existing Endeavour Energy Mt Druitt zone Substation and conversion of the two existing 132 kV transmission lines (Lines 932 and 219) to 330 kV. Option B was deemed unsuitable due to its cost, which was approximately three times greater than that of Option A. | No |

3. Proposed activity description

3.1. Proposed activity scope

The proposed activity would occur wholly within Transgrid's property boundary and would involve the following scope of works:

- Site establishment, including construction offices/amenities, equipment storage, stockpile, and laydown areas
- Vegetation removal and trimming of trees along the existing palisade fence north of the switchyard as well as at the northwest corner of the switchyard
- Construction of a new temporary access track to facilitate access to the new bench extension and extension of existing access track
- Drainage works including diversion of an existing stormwater drain and demolition/ rerouting of underground drainpipes
- Construction of an extension of substation bench (approximately 50 m x 65 m) on the northwestern side of the substation
- Relocation of existing No. 7 330 kV capacitor bank to the newly established bench extension
- Installation of one new 330 kV switchbay on the newly established bench extension.
- The following works within the existing substation switchyard:
 - Installation of new 330/132 kV transformer (No.6 transformer) within a new compound.
 - Installation of switchbays, including one 132 kV Live Tank Circuit Breaker and three 132 Dead Tank Circuit Breakers and two new voltage transformers
 - Installation of busbar including steel supports and post insulators.
 - Installation of new conduits/trenches and cables
 - Installation of secondary system equipment within the existing control room
- Installation of palisade fence around the perimeter of the new extended bench and removal of old fencing.
- Rehabilitation of disturbed areas once construction is complete including compaction, surfacing and planting new trees.

The scope of works is shown in Figure B-1.

3.2. Proposed activity location

Sydney West 330 kV Substation is located within the Blacktown local government area (LGA) with the nearest major township being Erskine Park, located approximately 1.6 km to the northwest. The substation site is located at 200 Old Wallgrove Road, Eastern Creek on Lot 22 DP1246626 which is owned by the Electricity Transmission Ministerial Holding Corporation and leased and managed by Transgrid.

For the purpose of this REF, the impact area is defined as the existing Sydney West 330 kV Substation, the area required for the new bench extension and new drainage infrastructure, area required for laydown and soil stockpiles, and the area required for the temporary access tracks to the new bench extension. The study area is defined as a 500 m buffer surrounding the impact area. The impact and study areas for the proposed activity are shown in Figure 3-1 and Appendix B.

The land use beyond the study area consists of industrial land uses and distribution centres with a relatively level topography.

A number of distribution lines (owned and operated by Endeavour Energy) traverse the impact area. The proposed activity requires Endeavour Energy to rearrange their 132 kV connection into the Sydney West 330 kV Substation. The proposed activity associated with bench extension and stormwater drain reconstruction necessitates Endeavour Energy distribution structures to be relocated due to the bench extension encroaching the high voltage clearance for the structure. Transgrid has sent a formal request to Endeavour Energy for the cable rearrangement and relocation of structure through a Transgrid Work Request Form to Distribution Network Service Provider (DNSP) (Need ID N2371 – Supply to Sydney West BSP, dated 6 February 2025), which has been subsequently actioned. The rearrangement of Endeavour Energy assets, including cable connection and structure relocation, are being undertaken by Endeavour Energy, and is outside the scope of this REF.

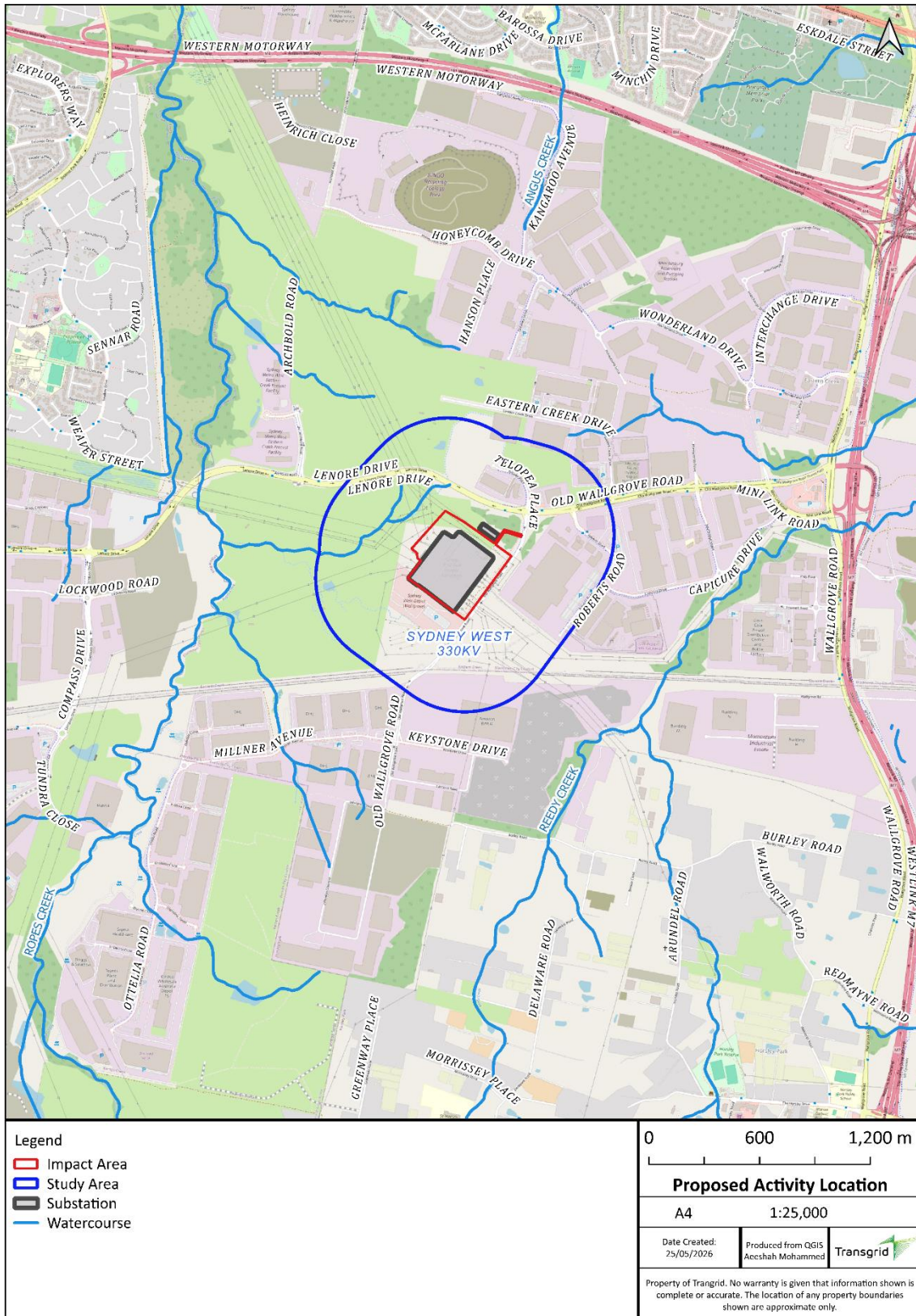


Figure 3-1 Proposed activity locality

3.3. Construction activities

3.3.1. Construction methodology

An overview of the construction methodology and key activities is outlined in Table 3-1 and illustrated in Figure B-1.

Table 3-1 Construction methodology and activities

| Stage | Activity | Overview |
|--------------------|---|--|
| Site establishment | Site area establishment | Prior to construction works commencing, construction offices/amenities, equipment storage, stockpile, and laydown areas would be designated at a suitable location wholly within the substation property boundary (refer to Figure B-1). |
| | Vegetation removal | This would involve vegetation trimming and clearing including the removal of 35 trees along the substation palisade fence to facilitate the access tracks to the bench extension and stockpile sites. Vegetation removal would be undertaken manually using chainsaws or mechanically with specialised harvesting equipment, depending on site conditions. Low-lying vegetation will be managed through slashing or excavation using appropriate machinery such as excavators. |
| | Temporary access tracks | Two new temporary access tracks would be established off Old Wallgrove Road to enable the delivery of the transformer into the switchyard and facilitate access to the bench extension and laydown area. This would involve the placement and compaction of a gravel layer and minor grading. |
| Construction | Stormwater drain diversion, demolition, and rerouting of underground drainpipes | <p>A stormwater drain traverses the proposed bench extension area and would be redesigned/diverted around the new bench. This would involve excavation to a depth of 1 m and width of 1 m north of the bench extension area and filling the impacted section of the existing drain with concrete. The drainage system design will be undertaken to satisfy the requirements specified in Transgrid's Standard Design Manual – Civil and Structures.</p> <p>Underground drainpipes, which also traverse the proposed bench area, would be demolished and rerouted prior to construction of the new bench. The drainpipes installation would be undertaken in accordance with <i>AS/NZS 1254: 2021 PVC-U pipes and fittings for stormwater and surface water applications</i>.</p> |
| | Bench extension | The areas required for the new bench would be approximately 50 m x 65 m. The existing maintenance corridor, which is the area of land immediately surrounding the Sydney West 330 kV Substation and contains Transgrid's easement and |

| Stage | Activity | Overview |
|-------|---|---|
| | | <p>associated access tracks, would be widened and levelled as required to facilitate the bench extension and temporary access track. All grass cover would be cleared within the area proposed for bench extension and a 700 mm topsoil layer would be removed and stockpiled on site.</p> <p>Imported fill would be required and shall be certified at its source location as pathogen and weed free Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM).</p> <p>Rock aggregate would then be spread across the extended bench, consistent with the existing switchyard.</p> <p>Once the new bench area has been completed and compacted, a palisade fence approximately 3 m in height would be installed around the perimeter of the bench in accordance with Transgrid's safety regulations and guidelines.</p> |
| | Relocation of No. 7 330 kV capacitor bank | <p>The existing No. 7 330 kV capacitor bank would be decommissioned and relocated to the new bench extension. The remaining capacitor bank slab, footings, firewall, firewall columns, and firewall footings would then be demolished.</p> |
| | Installation of new power 330/132 kV transformer and transformer compound | <p>A new transformer compound (approximately 25 m x 20 m) would be established within the switchyard to house the new No. 6 power transformer. Excavations of up to 1.5 m may be required for the compound footings.</p> <p>Four sided, approximately 8 m high, firewalls would be erected, if required, around the transformer compound to contain any fire hazards.</p> <p>The power transformer would be transported on-site on an over-size over-mass (OSOM) vehicle and jacked and skated or placed into position using a crane. The transformer would be oil-filled upon installation.</p> <p>The new transformer would connect to the existing spill oil containment system via flame trap, pipes, and pits.</p> |
| | Installation of new switchbays | <p>Three new switchbays would be installed to connect the relocated capacitor bank. This would involve installation of two new 132 kV switchbays within the existing switchyard and one new 330 kV switchbay installed in the new bench extension area. Each switchbay will require new footings approximately 5 m x 5 m and up to 1.5 m deep. Support structures would be installed on two concrete footings with caps approximately 5 m x 5 m and approximately 1.5 m</p> |

| Stage | Activity | Overview |
|----------------|--|--|
| | | <p>deep to support droppers that connect to the switchbay.</p> <p>Connections for the switchbays would utilise existing cable trenches where available, however, some new conduits would be required. New conduits would be confined to the existing substation, would be established using a small excavator, and would be limited to 300 mm depth.</p> <p>New switchbay installations would also include the installation of one new 132 kV Live Tank Circuit Breaker (LTCB), three new 132 kV Dead Tank Circuit Breakers (DTCB) and two new voltage transformers.</p> |
| | Installation of busbar | <p>Footings would be installed with concrete caps measuring approximately 3 m x 3 m and up to 1.5 m depth to provide a stable foundation and distribute structural loads from the busbar supports. Steel busbar supports would be mounted on the footings. Post insulators would then be placed on the steel supports to insulate the busbar. Finally, the busbar would be hoisted and affixed atop the post insulators using a crane.</p> |
| | Secondary systems installation | <p>Secondary system equipment (panels, marshalling kiosks, switchboards, distribution boards, etc.) would be installed as necessary and cable connections would be made within the existing control room using existing and new conduits/trenches.</p> |
| | Installation of conduits/trenches | <p>Connections for the newly installed equipment would utilise existing cable trenches where available, however, some new conduits/trenches would be required as determined during detailed design. New conduits/trenches would be established using a small excavator and would be limited to 300 mm in depth.</p> |
| Rehabilitation | Demobilisation and rehabilitation of disturbed areas | <p>Once construction is complete, rehabilitation works would proceed, comprising compaction, surfacing and planting new trees. Surplus excavated material and any waste materials would be disposed of off-site at an appropriately licenced waste facility.</p> |

3.3.2. Construction plant, material, and equipment

Typical key construction materials, vehicles and equipment include:

- Steel and structural supports
- Power transformer and other high voltage equipment
- Imported fill and aggregate as required
- Excavators
- Vacuum truck
- Bulldozer
- Trucks

- Bob cats
- Electrical conduit and cables
- Pile borer
- Elevated Work Platform (EWP)
- Cranes
- Concrete and concrete trucks
- Concrete saw
- Forklifts
- Utility vehicles
- General hand tools (powered and unpowered)
- Oil storage and pumping plant

3.3.3. Construction schedule

Construction of the proposed activity is expected to commence in June 2026 and take approximately 19 months to complete. Dates may vary with Transgrid’s program, but construction duration will remain similar.

3.3.4. Construction hours

Noise generating works would be limited to the recommended standard hours for construction work outlined in the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) which are:

- Monday to Friday 7:00am to 6:00pm.
- Saturday 8:00am to 1:00pm.
- No works on Sundays or Public Holidays.

Work outside standard hours would only comprise:

- The delivery of materials outside standard hours requested by police or other authorities for safety reasons.
- Emergency work to avoid the loss of lives and/or property.
- Work timed to correlate with system planning outages.
- Vacuum and oil filling of equipment.

If the need for additional noise generating works outside standard construction hours is identified following the determination of this REF, the works would require justification in accordance with the ICNG and the prior formal written consent of Environment Business Partner/Delivery.

3.4. Operation and maintenance

The proposed activity would not result in any significant changes to existing operational or maintenance activities. Following the completion of construction works, ongoing and periodic maintenance of the substation would continue. As required, Transgrid would review and amend its existing management system and maintenance requirements to incorporate any changes from the proposed activity.

4. Statutory context

4.1. Approvals pathway

4.1.1. Environmental Planning and Assessment Act 1979

The EP&A Act and the EP&A Regulation provide the framework for development assessment in NSW. The EP&A Act contains a number of different planning approval pathways for the assessment of development proposals in NSW and is determined by relevant environmental planning instruments such as Local Environmental Plans (LEPs) and State Environmental Planning Policies (SEPPs).

As described below, the proposed activity would be permitted without development consent in accordance with the *State Environmental Planning Policy (Transport and Infrastructure) 2021* (Transport and Infrastructure SEPP), and the proposed activity is therefore subject to the assessment requirements of Division 5.1 of the EP&A Act.

Transgrid is an Authorised Network Operator (ANO) under *the Electricity Network Assets (Authorised Transactions) Act 2015*. Transgrid is also a prescribed determining authority under Section 5.6 of the EP&A Act and Clause 3(3) and Schedule 1(4) of the EP&A Regulation, for development for the purposes of an electricity transmission or distribution network that is permitted without consent (within the meaning of the Transport and Infrastructure SEPP) and is operated or to be operated by the ANO. Accordingly, Transgrid is the proponent and determining authority for this proposed activity.

4.1.2. State Environmental Planning Policy (Transport and Infrastructure) 2021

The Transport and Infrastructure SEPP aims to facilitate the delivery of infrastructure across NSW. Section 2.44 of the Transport and Infrastructure SEPP provides that development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without development consent on any land.

As this proposed activity meets the definition of development for the purposes of an electricity transmission or distribution network under Section 2.44 of the Transport and Infrastructure SEPP and would be carried out by Transgrid (an ANO), the proposed activity is permitted without consent.

4.2. Other relevant Commonwealth and NSW legislation

Other Commonwealth and NSW environmental legislation relevant to the assessment or determination of the proposed activity is outlined in Table 4-1.

Table 4-1 Relevant Commonwealth and NSW legislation

| Legislation | Potential approval requirements | Relevance to the proposed activity | Permit/ licence requirement |
|---|---|---|-----------------------------|
| Commonwealth legislation | | | |
| <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) | Under the EPBC Act, matters of national environmental significance (MNES) are considered to assist in determining | MNES have been considered in Section 7.3 (Table 7-3). As no significant impacts are likely, the proposed activity | N/A |

| Legislation | Potential approval requirements | Relevance to the proposed activity | Permit/ licence approval/ requirement |
|---|--|---|---------------------------------------|
| | whether the proposed activity should be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW). | has not been referred to Cth DCCEEW. | |
| NSW legislation | | | |
| <p><i>Biodiversity Conservation Act 2016</i> (BC Act)</p> | <p>The BC Act lists a number of threatened species, populations, ecological communities and declared areas of outstanding biodiversity value to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats.</p> <p>If any of these could be impacted by the proposed activity, an assessment of significance that addresses the requirements of Section 7.3 of the BC Act must be completed to determine the significance of the impact.</p> <p>Under Section 7.3 of the BC Act, the determining authority (being Transgrid) has a duty to take into account whether there is likely to be a significant effect on threatened species, ecological communities, or their habitats or whether the activity is to be carried out on a declared area of outstanding biodiversity value.</p> | <p>The proposed activity would involve minor vegetation trimming, and removal of plants/trees including:</p> <ul style="list-style-type: none"> two mature <i>Angophora floribunda</i> (Rough-barked Apple) trees observed near the proposed bench extension area, approximately 15 <i>Acacia saligna</i> (Golden Wreath Wattle) planted native trees along the southern access track to enable vehicle access, approximately 18 <i>Casuarina glauca</i> (Swamp Oak) small planted native trees occupying an approximate area of 100 m² in the area proposed for stormwater drain diversion, approximately 3500 m² of grass cover (mixed species). <p>Impact assessment concluded that the proposed activity is unlikely to impact any threatened species, populations, ecological communities and would not be carried out on a declared area of outstanding biodiversity value listed under the BC Act.</p> <p>Section 6.4 provides details of the potential impacts to ecology and control</p> | N/A |

| Legislation | Potential approval requirements | Relevance to the proposed activity | Permit/ approval/ licence requirement |
|--|--|--|---------------------------------------|
| <p><i>Biosecurity Act 2015</i> (Biosecurity Act)</p> | <p>The Biosecurity Act provides a framework for the prevention, elimination and minimisation of biosecurity risks. This Act imposes a 'general biosecurity duty' on any person who deals with biosecurity matters or carriers to ensure that so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.</p> <p>Transgrid has identified three biosecurity zones that are relevant to its works. Within these three zones, three high priority weed species are identified; Alligator Weed, Bitou Bush and Water Hyacinth. Should any of these three weed species be identified (across NSW), notification to the Local Land Authority is required.</p> | <p>measures implemented to minimise impacts.</p> <p>The ecology assessment identified the presence of Bitou Bush, in the area of the proposed activity. Bitou Bush is identified by Transgrid as a high priority weed (in relation to a biosecurity zone).</p> | <p>N/A</p> |
| <p><i>Heritage Act 1977</i> (Heritage Act)</p> | <p>Approval under Section 57(1) is required for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register.</p> <p>Section 57(2) provides that an exemption from the approval requirements of Section 57(1) can be sought in certain circumstances.</p> <p>An excavation permit is required under Sections 139(1) and (2) to disturb or excavate any land containing or likely to contain a relic.</p> | <p>There are no heritage listed items near the proposed activity and the activity would not involve disturbing or excavating land on which a relic is located or likely to be located (see Section 6.6). Therefore, no permits or approvals are required under the Heritage Act.</p> | <p>N/A</p> |

| Legislation | Potential approval requirements | Relevance to the proposed activity | Permit/ approval/ licence requirement |
|--|--|--|---------------------------------------|
| | <p>Section 139(4) provides that exceptions from the approval requirements of Sections 139(1) and (2) can be sought in certain circumstances.</p> | | |
| <p><i>National Parks and Wildlife Act 1974</i> (NPW Act) and <i>National Parks and Wildlife Regulation 2019</i> (NPW Regulation)</p> | <p>An Aboriginal heritage impact permit (AHIP) under Section 90 of the NPW Act is required to harm or desecrate an Aboriginal heritage object.</p> <p>If works are located in land reserved under the NPW Act, consent from NSW Department of Climate Change, Energy, the Environment and Water (National Parks and Wildlife Service) is required.</p> <p>The NPW Regulation includes provisions for Assets of Intergenerational Significance (AIS).</p> <p>An AIS can be any area of exceptional value, natural or cultural, that warrants special protection, including dedicated management measures.</p> <p>If works are located on land (or within close proximity of) identified as an Asset of Intergenerational Significance (AIS), a proposed activity must be consistent with the purpose of the AIS's declaration and Conservation Action Plan (CAP) (if relevant).</p> | <p>The proposed activity would not impact any registered Aboriginal heritage sites and therefore a permit under Section 90 of the NPW Act is not required.</p> | <p>N/A</p> |

5. Consultation

5.1. Consultation undertaken to date

Transgrid has consulted with Blacktown City Council and adjoining landowners/occupiers in accordance with relevant legislation as summarised in this section.

5.1.1. Electricity Supply Act 1995

Section 45(4) of the *Electricity Supply Act 1995* requires that the local council be given a reasonable opportunity (no less than 40 days notification from the date on which the notice was given) to make submissions on the proposed activity.

Notification was provided to Blacktown City Council on 3 July 2025 in accordance with the *Electricity Supply Act 1995*. Council was provided with 40 days to provide a submission in accordance with Section 45(4) of the *Electricity Supply Act 1995*. No response was received.

5.1.2. State Environmental Planning Policy (Transport and Infrastructure) 2021

The occupiers of adjoining land were also notified of the proposed activity on 3 July 2025 and 8 July 2025 under Section 2.45 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*. This notification invited submissions to be taken into consideration within 21 days of the notice being given.

A response was received from two adjoining landholders on 3 July and 29 July 2025 from WaterNSW and Jacfin, respectively, with issues raised and addressed discussed further in Table 5-1 below.

5.1.3. Community consultation

Early community consultation was not undertaken as the proposed works are not considered to affect the broader community. Furthermore, the proposed works are occurring within the Transgrid owned substation property boundary.

5.1.4. Issues raised

Table 5-1 details the issues raised during consultation and how they have been addressed.

Table 5-1 Issues raised during consultation and how addressed

| Stakeholder | Issues raised | How addressed |
|----------------|---|---|
| WaterNSW | No objections raised but asked to be notified when works commence and when there are any project updates | <ul style="list-style-type: none"> Adjoining landholders, including WaterNSW, will be notified prior to works commencing (as per mitigation measure SE1 in Appendix C). If any project updates occur during the preparation of the environmental assessment, WaterNSW will be notified via email. |
| Jacfin Pty Ltd | <ul style="list-style-type: none"> Transgrid to confirm whether the proposed activity is classified as | <ul style="list-style-type: none"> Transgrid responded to the matters raised on 27 January 2026 by providing the necessary clarifications |

| Stakeholder | Issues raised | How addressed |
|-------------|---|---|
| | <p>Class 3 or Class 4 under the NSW Code of Practice for ANOs.</p> <ul style="list-style-type: none"> • Transgrid to provide further details of the nature and scope of the proposed works, including a plan of the proposed works. • Transgrid to provide a copy of the environmental assessment, once complete, for Jacfin’s review | <p>and supplying additional project information.</p> <ul style="list-style-type: none"> • Following the revocation of the Code of Practice for ANOs (effective 15 February 2026), Transgrid provided another written communication on 9 March 2026 to inform Jacfin that the environmental assessment for the proposed activity is undertaken as an REF in accordance with Division 5.1 Guideline, pursuant to Part 5, Division 5.1 of the EP&A Act. • A copy of the REF shall be shared with Jacfin once it has been determined. |

6. Environmental impact assessment

6.1. Land use

6.1.1. Existing environment

The impact area is currently used for the purpose of electricity transmission as a substation and depot with office premises for Transgrid employees and is predominantly located on land zoned as SP2: Infrastructure under the *Blacktown Local Environmental Plan 2015* (Blacktown LEP). A Battery Energy Storage System (BESS) facility, owned and operated by Transgrid, is situated immediately north of the impact area. 132 kV distribution lines (owned and operated by Endeavour Energy) also traverse the impact area, with a number of their distribution structures being located within Transgrid's substation property boundary. The study area is characterised by industrial complexes, distribution centres, and waste facility developments.

6.1.2. Impact assessment

Construction

The construction of the proposed activity would be located entirely within Transgrid's existing property boundary. The proposed activity would not impose any new restrictions on land use within the study area and would not require access to privately owned land. Temporary land use changes are expected during construction to accommodate soil stockpiling, site laydown and temporary access tracks; however, all disturbed areas would be rehabilitated following the completion of construction.

Operation

The proposed activity would be consistent with the existing land use of the study area and would have no impact on adjacent land uses. During operation, there would be a minor permanent land use change in the area immediately northwest of the existing substation switchyard which would be occupied by the new bench extension.

6.2. Geology and soils

6.2.1. Existing environment

The topographic landscape of the study area is typically flat. Underlying soils within the existing substation bench consist of a mixture of fill material, generally comprising brown silty clay with trace gravel, used as part of the initial construction of the substation. The surface geology underlying the study area is Bringelly Shale (Twib) from the Middle Triassic, consisting of quartz-lithic to quartz-rich sandstone with conglomerate, mudstone, and siltstone. Bringelly Shale forms part of the Wianamatta Group which is recognised as a distinct unit at the top of the Sydney Basin.

Acid Sulphate Soils (ASS)

A review of Transgrid's Spatial System on 19 January 2026 did not identify the presence of ASS within the study area.

Naturally Occurring Asbestos (NOA)

A review of Transgrid's Spatial System on 19 January 2026 did not identify the presence of NOA within the study area.

Contamination

A review of Transgrid's Spatial System, the Environment Protection Authority's (EPA) list of notified sites, and the EPA contaminated land record on 19 January 2026 did not identify any contaminated land within the study area.

A Hazardous Material Assessment Report by Healthy Buildings International (2025) identified asbestos containing material (ACM) in the control building, 415V/compressor building, switchyard conduits (including those under buildings and buried within moulded cement) and electrical components, and the central building. Lead paint was also identified on the control building doors (to switchyard). All materials classified as ACM were identified to pose a very low risk rating while the lead paint coating identified on the control building doors was classified as having a low risk rating.

6.2.2. Impact assessment

Construction

During construction, the main risks to geology and soils would be from erosion and sedimentation associated with ground disturbance activities as associated with bench extension, installation of the temporary access tracks, and installation of conduits/trenches, switchbays, and busbars. The total volume of soil excavated is expected to be up to 4000 m³, and excavation would be undertaken by a small excavator. Approximately 11,000 m³ of fill would be required to level the area proposed for the bench extension. Areas of exposed soil, including stockpiles, have the potential to become eroded, leading to potential sedimentation impacts on the surrounding land. These risks are expected to increase during high wind and rainfall events. A Soil and Water Management Plan (SWMP) would be prepared for the proposed activity to ensure potential erosion and sedimentation impacts during construction are effectively managed (refer also to GS1, Appendix C). Imported fill may also introduce contaminants if it contains any residual polluted material, creating a potential source of secondary contamination. All imported fill would be certified at source location as pathogen and weed free Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM) (refer also GS3 and GS4, Appendix C).

Whilst there is no known contamination within the study area, the ongoing use of hydrocarbons (namely oil in high voltage plant such as transformers) indicates a potential risk of contamination in underlying soils, which may be encountered during ground disturbance. Accidental spills or leaks of fuels, oils and other chemicals from plant, equipment and vehicles used during construction could further contribute to contamination risks. Potential impacts associated with the disturbance and management of contaminated soil, should it be encountered during the proposed activity, are expected to be minor providing the mitigation measures in Appendix C are implemented.

Construction, removal, and demolition works are proposed to be undertaken within areas where ACM has been identified (within the switchyard). ACM presence may cause potential contamination impacts to underlying soil and risks to human health, if not handled correctly. Removal of materials/equipment/conduits with ACM or potential ACM would be undertaken by a suitably qualified asbestos removal contractor and disposed of in accordance with relevant legislation (refer also to GS5, Appendix C). Lead paint identified within the substation would not be disturbed as part of the proposed activity.

With the implementation of the mitigation measures in Appendix C, risks to geology and soils during construction of the proposed activity can be effectively managed and are expected to be minor.

Operation

The proposed activity would not result in any additional impacts to underlying geology and soils or pose any additional contamination risk as part of the ongoing operation of the substation. The new transformers would be located in bunded areas to manage spills that may occur during operation. Additionally, the existing spill oil containment tanks, have been deemed sufficient for the new transformers. During operation, with the continued use of the spill oil containment system, the risk of oil spill is considered to be low.

6.3. Hydrology and water quality

6.3.1. Existing environment

The closest water feature to the impact area is a non-perennial tributary of Ropes Creek, located approximately 130 m west of the impact area. There are also three small unnamed man-made waterbodies located more than 150 m from the impact area (see Figure B-2). A man-made stormwater drain is located within the impact area.

The study area is located on relatively flat land and is not located within a flood planning area under the Blacktown LEP, or within flood prone land.

A review of Transgrid's Spatial System on 19 January 2026 did not identify groundwater vulnerability within the study area.

Whilst there is no groundwater data available specific to the impact area, a review of available groundwater data held by WaterNSW identified the nearest registered groundwater bore (GW114926) as being located approximately 480 m east of the impact area. Groundwater bore GW114926 was drilled to a depth of 13.5 m. No groundwater was encountered at the time of drilling.

6.3.2. Impact assessment

Construction

During construction, the main risks to water quality would be sedimentation into nearby waterways and stormwater drains as a result of run-off from ground disturbance activities particularly the earthworks associated with the bench extension and access track works. The reconstruction of the stormwater drain, if not managed properly, would pose potential risk to water quality on Ropes Creek and other waterways downstream. Additionally, there may be risks to water quality resulting from accidental spills during the refuelling of plant and machinery. These potential impacts on surface water quality would be adequately managed through the implementation of the mitigation measures in Appendix C.

Although groundwater vulnerability has not been identified within the impact area, due to the extent of excavations there is the potential for groundwater to be encountered. If encountered, the volume of dewatering is expected to be negligible and would not trigger the requirement for a licence. If encountered, dewatering would be carried out in accordance with mitigation measure HW3 (refer to Appendix C) to minimise impacts on the receiving environment.

The proposed activity would not significantly alter the shape and contour of the land within the study area. As such, the flood regime of the study area is not expected to be affected.

Operation

The main risks to hydrology and water quality during operation would be the risk of oil spill from the new transformer. However, the new transformer would be connected to the substations existing spill oil containment system, which is considered sufficient for the entire substation in the event of an oil spill. During operation, with the continued use of the spill oil containment system, the risk of oil spill is considered to be low.

Stormwater flows would be managed by the existing stormwater and oil containment system including the newly reconstructed stormwater drain. As such, the proposed activity is not expected to alter the risk of water quality impacts occurring as part of the ongoing operation of the substation.

6.4. Ecology

6.4.1. Existing environment

A portion of the study area has been highly disturbed due to the construction of the Sydney West 330 kV Substation and depot/ office premises for Transgrid employees. The existing substation is completely devoid of any vegetation, while the proposed bench extension area consists of maintained grass cover and a small patch of trees.

A desktop ecological due diligence assessment was undertaken in accordance with Transgrid's Ecological Due Diligence Assessment Procedure (June 2023), as provided in Appendix A. The assessment did not identify any moderate/high risk threatened species within 500 m of the impact area, however there are records of two Plant Community Types (PCTs) associated with threatened ecological communities (TECs) mapped within the impact area and wider study area (refer to Table 6-1 and Figure B-3).

Table 6-1 Ecological entities within 500 m of impact area

| Location | Associated Threatened Ecological Communities (TEC) | BC Act Conservation Status | EPBC Act Conservation Status |
|---|---|----------------------------|------------------------------|
| <i>PCT 3320 Cumberland Shale Plains Woodland</i> | | | |
| Partially located within area proposed for new drainage infrastructure and borders the existing access track from Old Wallgrove Road. | <ul style="list-style-type: none"> Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act, Critically Endangered Ecological Community (CEEC)) Shale Gravel Transition Forest in the Sydney Basin Bioregion (BC Act, Endangered Ecological Community (EEC)) Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act, CEEC) | CEEC | Not listed |
| <i>PCT 4025 Cumberland Red Gum Riverflat Forest</i> | | | |

| Location | Associated Threatened Ecological Communities (TEC) | BC Act Conservation Status | EPBC Act Conservation Status |
|--|---|----------------------------|------------------------------|
| Approximately 80 m west of the proposed impact area. | <ul style="list-style-type: none"> River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (BC Act, EEC); River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria (EPBC Act, CEEC) | Not listed | CEEC |

Due to potential impacts to ecological entities resulting from proposed vegetation clearing (including tree removal) and ground disturbance activities, a field assessment was undertaken to assess the work location.

Transgrid Authorised Officers undertook a site visit on 23 January and 29 May 2026 to determine whether impacts to ecology from the proposed works can be avoided (Appendix D). The site visit involved walking through the Sydney West 330 kV Substation and the area outside the switchyard proposed for the bench extension, laydown, stormwater drain diversion and access track establishment.

The Authorised Officers noted the presence of birds, particularly Magpies (*Gymnorhina tibicen*), kangaroos (*Macropus giganteus*), and rabbits (*Oryctolagus cuniculus*) within the impact area outside of the switchyard. The ground cover within the impact area outside of the switchyard consists of grass, improved pasture species, and a mix of common pasture weeds. The site is largely open and devoid of significant tree cover, except for the following planted native trees:

- A group of *Casuarina glauca* (Swamp Oak) trees located along the existing stormwater drain.
- Two mature *Angophora floribunda* (Rough-barked Apple) trees near the proposed bench extension area.
- One juvenile *Eucalyptus tereticornis* (Forest Red Gum) tree occurring in isolation along the southern access track and two trees near the area proposed for stormwater drain diversion.

Visual inspection of the trees marked for removal did not identify any stick-nests or hollows, or other signs of habitat. A small patch of juvenile Cumberland Shale Plains Woodland trees (known TEC) was observed on the western edge of the impact area boundary, located near the existing stormwater drain.

There were several invasive weed species observed onsite, especially concentrated along the existing stormwater drain line and along the access tracks on occasion. The following weed species were identified within the impact area:

- Acacia saligna* (Golden Wreath Wattle) present along the access tracks and adjacent to the northern stockpile location.
- Lycium ferocissimum* (African Boxthorn) observed along the existing stormwater drain line.
- Solanum pseudocapsicum* (Jerusalem Cherry) observed along the existing stormwater drain line.
- Asparagus asparagoides* (Bridal Creeper) observed along the existing stormwater drain line.
- Araujia sericifera* (Moth Vine) observed along the existing stormwater drain line.

Overall, the vegetation composition and condition within the proposed impact area is consistent with disturbed and industrial-adjacent environments, where exotic species are prevalent and native vegetation is generally restricted to remnant trees or plantings associated with landscaping or infrastructure works.

Given these factors, the ecological value of the site is assessed as low, with only localised pockets of slightly higher value associated with remnant native trees and the nearby waterway corridor.

6.4.2. Impact assessment

Construction

The proposed activity would involve the following direct impacts on vegetation within the impact area:

- Direct removal and/or disturbance of approximately 3500 m² of underlying grass cover as part of the bench extension, establishment of the laydown area and stockpiling of soils.
- Removal of up to two *Angophora floribunda* (Rough-barked Apple) trees for the bench extension.
- Removal of approximately 15 *Acacia saligna* (Golden Wreath Wattle) plants along the southern access track to enable vehicle access.
- Removal of approximately 18 *Casuarina glauca* (Swamp Oak) trees occupying an approximate area of 100 m² in the area proposed for stormwater drain diversion.
- Trimming of vegetation along southern access track to enable vehicle access.

The underlying grass cover, vegetation, and trees marked for removal or trimming do not form part of any threatened ecological community or endangered ecological community and are unlikely to contain any threatened flora species or provide habitat to any threatened fauna species.

The removal of two *Angophora floribunda* (Rough-barked Apple) trees and approximately 18 *Casuarina glauca* (Swamp Oak) trees would be offset by planting replacement trees around the extended bench to compensate for the vegetation clearing required for bench extension and stormwater drain diversion. A compensatory planting ratio of 1:2 would be undertaken for the *Angophora* trees, therefore requiring the establishment of a minimum of four replacement *Angophora* trees using locally appropriate native species. In addition, replanting or rehabilitation should be undertaken for an equivalent area to that of *Casuarina glauca* (Swamp Oak) trees removed, where feasible and appropriate within the surrounding landscape at the completion of the proposed activity (refer to mitigation measure EC4, Appendix C).

Furthermore, two no-go zones would be established to protect the identified TECs and *Eucalyptus tereticornis* trees being retained within the proposed impact area (illustrated in Figure B-3). Implementation of mitigation measures EC3 and EC5 (Appendix C) would ensure impacts to trees resulting from the proposed activity can be avoided, therefore no further specialist ecology assessment was undertaken.

Impacts to ecology would be adequately managed with the implementation of the mitigation measures in Appendix C. The proposed activity would be unlikely to significantly affect any threatened species, populations, ecological communities and would not be carried out on a declared area of outstanding biodiversity value.

Operation

The proposed activity would unlikely affect any threatened species, populations, or ecological communities during the ongoing operation of the Sydney West 330 kV Substation.

6.5. Aboriginal heritage

6.5.1. Existing environment

The study area has been previously disturbed for the purposes of its use as an electrical substation. The existing substation bench has been completely modified, where natural shallow soils have been removed and replaced with fill material across the substation as part of the initial construction of the substation. The remainder of the impact area, external to the existing substation bench, has been moderately disturbed from its original state as part of vegetation clearing for the construction of access tracks and potentially for grazing purposes.

A desktop Aboriginal heritage due diligence assessment was undertaken in accordance with Transgrid's Aboriginal Heritage Due Diligence Assessment Procedure (February 2022), as provided in Appendix A.

A search of Transgrid's spatial system on January 2026 identified two known heritage sites located within 100 metres of the impact area (refer to Appendix A and Figure B-4). Further verification of the site cards was undertaken of the known sites:

- [REDACTED]
- [REDACTED]

6.5.2. Impact assessment

Construction

The desktop Aboriginal heritage risk assessment in Appendix A identified that all known Aboriginal heritage sites can be avoided, and that there is not a moderate or high risk of affecting Aboriginal heritage. The proposed ground disturbance works closest to the heritage site involves reconstruction of stormwater drain and tree removal. These works would be carried out more than 130 m away from the heritage sites. The works would be localised, and the disturbance would be limited to the proposed impact area boundary. Impacts to [REDACTED] and [REDACTED] are considered unlikely given the distance of the heritage site from the proposed impact area. Desktop investigation of landscape features determined that no landscape features were present in the impact area and the likelihood of presence of an Aboriginal heritage site within the impact area is unlikely. Therefore, no further heritage assessment is required. Notwithstanding, unexpected finds protocol in Appendix C would be implemented in the unlikely instance the Aboriginal heritage is encountered during ground disturbance works.

Operation

The proposed activity would not result in any additional impacts to Aboriginal heritage as the ongoing operation of Sydney West 330 kV Substation will remain unchanged.

6.6. Historic heritage

6.6.1. Existing environment

A search of the following databases was undertaken on 19 January 2026 to identify items and places of historic heritage recorded within the study area:

- World Heritage Register
- Commonwealth Heritage Register
- National Heritage Register
- NSW State Heritage Register and State Heritage Inventory (including Section 170 Register for NSW government agencies)
- Blacktown LEP
- Fairfield Local Environmental Plan 2013 (Fairfield LEP)

No items of historic heritage were identified within the study area.

6.6.2. Impact assessment

Construction

The proposed activity would be confined to the Transgrid property boundary, with no heritage listed items present within the study area. As such, the proposed activity would not impact any known historic heritage sites. However, in the unlikely instance that historic heritage items are encountered, the unexpected finds protocol (refer to Appendix C) would be implemented.

Operation

The proposed activity would not result in any impacts to historic heritage as part of its ongoing operation.

6.7. Noise and vibration

6.7.1. Existing environment

A noise impact assessment (NIA) was prepared by WSP (2024) to assess the potential operational noise impacts associated with the proposed activity. The assessment is provided in Appendix E.

The noise environment of the study area is best described as an industrial area with an acoustic environment that is predominantly characterised by heavy vehicle traffic noise on Lenore Drive and Old Wallgrove Road, with additional environmental noise from wildlife, such as birds and insects.

The NIA identified a total of 12 noise sensitive receivers within 2 km of the proposed activity. Noise sensitive receivers consist of residential, commercial and industrial properties to the northwest and southeast of the study area. The following receivers have been identified within the study area (500 m) of the proposed activity:

- R09 – 10 Roberts Road, Eastern Creek (industrial property) – 165 m northeast of the proposed activity
- R10 – 2/4 Roberts Road, Eastern Creek (commercial property) – 270 m northeast of the proposed activity
- R11 – 2 Telopea Road, Eastern Creek (commercial property) – 270 m northeast of the proposed activity
- R12 – 1 Telopea Road, Eastern Creek (commercial property) – 190 m of the proposed activity.

All residential properties are located more than 1 km away from the proposed activity, within the suburbs of Erskine Park and Horsley Park, with the closest one located 1.2 km northwest.

All identified noise sensitive receivers are also considered potentially vibration sensitive.

6.7.2. Impact assessment

Construction

During construction, the proposed activity has the potential to generate temporary noise and vibration impacts from:

- Access by plant and vehicles to where works are proposed.
- Night-time delivery of material and equipment (e.g. No. 6 transformer), which may result in increased noise impacts outside of construction hours.
- Earthworks for establishment of new access tracks, or maintenance / repair of existing access tracks and construction benches using excavators, dozers, and rollers.
- Noise generated from plant and machinery (boring equipment, crane, bulldozer, and power tools) associated with the removal and installation of new substation components.
- Reversing beepers from trucks.
- Minor rock breaking, if required due to ground conditions.

Traffic generated by the construction activities is not expected to be significant compared with the existing traffic and therefore noise impacts on the existing roads as a result of construction generated traffic are not anticipated.

There are no significant vibration generating items proposed as part of the work. Standard construction management measures should be included as part of the work method and as a result, vibration impacts on sensitive receivers are not anticipated.

Overall, given the distance of the sensitive residential receivers from the proposed activity, the noise and vibration impacts during construction are anticipated to be minor and manageable by implementing mitigation measures NV1 and NV2 in Appendix C.

Operation

In accordance with the Noise Policy for Industry (EPA, 2017), the Project-specific Noise Trigger Levels (PNTL) adopted for operational noise at the modified Sydney West 330 kV Substation were as follows:

- 48 dBA during standard daytime hours, and 37 dBA during evening and night time hours for residential receivers in Erskine Park.
- 65 dBA during standard daytime, evening and night time hours for industrial receivers in Horsely Park.
- 47 dBA during standard daytime hours, 39 dBA during evening hours and 38 dBA during night time hours for residential receivers in Horsely Park.
- 65 dBA during standard daytime, evening and night time hours for industrial receivers in Eastern Creek.
- 65 dBA during standard daytime, evening and night time hours for commercial receivers in Eastern Creek.

The results of the operational noise assessment determined that the proposed activity (including the new power transformer and relocation of the capacitor bank) is expected to demonstrate compliance with the PNTL for all representative noise sensitive receivers surrounding the study area during daytime, evening, and night-time hours. Given this, operational noise impacts would be negligible and no additional noise mitigation and management measures are required.

6.8. Traffic and access

6.8.1. Existing environment

Major transport infrastructure within the study area includes the Westlink M7 Motorway, Great Western Highway, M4 Motorway and Lenore Drive (classified State roads). Access to the impact area is provided by an existing driveway off Old Wallgrove Road. Currently the substation and associated office premises are accessed by operational personnel, Transgrid employees, and periodic contractors for business, maintenance, and operational purposes. Vehicle parking space is available within the study area, adjacent to the depot/ office premises.

6.8.2. Impact assessment

Construction

During construction, the existing access tracks off Old Wallgrove Road (currently used for the BESS) would be utilised to access the Sydney West 330 kV Substation. Additionally, two new temporary access tracks would be constructed and the existing maintenance corridor extended to facilitate access to the bench extension and laydown area (refer to Figure B-1).

The proposed activity would generate a temporary increase in traffic on the surrounding road network associated with the delivery of equipment, fill material, machinery and plant, transportation of waste off-site and the daily arrival and departure of the construction staff. Approximately 15 light vehicles and 10 heavy vehicles are expected to be required to facilitate these works per day. As a result, an increase in traffic is expected during construction, however, this would be short term and would not impact the safety and function of the existing surrounding road network given the proposed activity's location being with an industrial area and near major roads. Parking of construction vehicles is available within Transgrid's property.

The proposed activity would also require the transport of high mass equipment such as transformers, steel, and structural supports. These materials and equipment would generally be transported using a range of truck types (including oversize-over mass (OSOM)) and utility vehicles. The delivery of the transformer would be carried out using an OSOM vehicle and in accordance with the relevant permits from council and Transport for NSW (TfNSW). OSOM vehicles require progressive road closures, which has potential to disrupt the local road network. The loading and unloading of materials and equipment can be undertaken sufficiently within the Sydney West 330 kV Substation property boundary. Given that the delivery of the transformer by OSOM is likely to be undertaken at night, outside peak traffic hours, the potential disruption to local network is expected to be minor and manageable by implementation of the mitigation measures outlined in Appendix C.

Operation

Once construction is complete, there would be no increase in traffic movements during the ongoing operation of the substation. Therefore, no operational impacts to traffic and access are expected.

6.9. Air quality

6.9.1. Existing environment

The air quality within the study area is expected to be typical of an industrial landscape. Primary anthropogenic sources of emission would include exhaust emissions from vehicle use within the study area, surrounding properties, and nearby roads including Westlink M7 Motorway.

A review of the National Pollutant Inventory (DCCEEW 2025) on 19 January 2026 found the following facilities within 1 km of the study area:

- PGH Bricks and Pavers Horsley Park, located within the study area which may generate dust emissions from clay brick manufacturing.
- Coca-Cola Amatil Eastern Creek, located 1 km west of the study area which may release greenhouse gas emissions from plastic packaging production processes.

6.9.2. Impact assessment

Construction

The main risks to air quality from the proposed activity would be dust emissions from ground disturbance activities including bench extension and access track construction, soil stockpiling and vehicle movements on disturbed ground or unsealed access tracks within the study area. There is also the risk to air quality during transportation of fill material. The dust load generated over a typical construction day is expected to be minor and not result in reduced local air quality, provided that mitigation measures in Appendix C are implemented during construction. Other negligible risks to air quality include exhaust emissions from vehicle and equipment use across the study area.

The proposed activity would also involve the installation and replacement of circuit breakers, which contain SF₆, which is a commonly used insulation gas. SF₆ has a high greenhouse gas equivalent, meaning its release into the atmosphere, especially in large quantities, can contribute to the greenhouse effect. Within the high voltage equipment, SF₆ is sealed within gas-tight compartments, however leaks have the potential to occur. In the event of an unplanned release of SF₆ from the equipment, the quantity of SF₆ potentially being emitted into the atmosphere would be minor in nature and would not contribute to the effects of climate change. Therefore, impacts to air quality resulting from unplanned SF₆ release are not considered to be significant and can be effectively managed by implementing mitigation measures (HR3) outlined in Appendix C.

Operation

During operation, the proposed activity would not result in any additional air quality impacts.

6.10. Hazards and risks

6.10.1. Existing environment

Electric and Magnetic Fields (EMF)

Electric and Magnetic Fields (EMF) are part of the natural environment and are also produced wherever electricity or electrical equipment is used. Electric fields are stronger with higher voltage and are greatest closest to wires and equipment, decreasing rapidly with distance. Most materials can block or reduce electric

fields. Magnetic fields are also strongest near wires and electrical equipment and diminish quickly with distance, however, most materials do not shield magnetic fields.

Transgrid's designs and maintains its assets in accordance with relevant Australian and International standards for EMF. In particular, Transgrid follows the International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2010 Guidelines for limiting exposure to EMF. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), the federal agency responsible for EMF-related human and environmental health, has adopted the ICNIRP guidelines which set exposure limits for various types of electrical equipment and the nature of the exposure.

Sydney West 330 kV Substation contains high voltage electrical infrastructure for the purpose of its use as an electricity substation and therefore is a source of EMF.

Bushfire prone land

A review of TSS and the NSW ePlanning Spatial Viewer on 19 January 2026 did not identify any bushfire prone land within the study area.

6.10.2. Impact assessment

Construction

Bushfire

As the proposed activity would be undertaken within highly disturbed and completely modified land that is mostly devoid of mature vegetation (impact area), and bushfire prone land is not located within the study area, bushfire impacts are unlikely. However, due there would be fire risks associated with construction of the propose activity primarily associated with hot works (activities involving high temperatures), fire-risk works (activities involving heat and the potential to generate sparks), vegetation clearing, and the use of vehicles, plant and equipment. In this case, mitigation measure HR2 (refer to Appendix C) would be implemented to reduce this risk.

Operation

EMF

The proposed activity would only result in localised changes to EMF in the immediate vicinity of the new and replaced high voltage equipment. This level of EMF would be consistent with the existing substation, and it is not considered that the EMF levels would negatively impact the local community. All designs would be in accordance with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to EMF (ARPANSA, 2010). Furthermore, the existing site security system and new palisade fence around the extended bench would prevent unauthorised access by the public during ongoing operation.

Bushfire

The proposed activity is not located on bushfire prone land and would not introduce additional bushfire risk to the area. The existing substation infrastructure (i.e. firewalls and spill oil containment) would adequately contain any fire hazard within the substation. Consideration has been given to the provision of Asset Protection Zone (APZ) needed to protect the substation from fire risk. The APZ of the substation would remain the same as the extended bench sits within this space. Given this, the bushfire risk during ongoing operation

of the substation would remain unchanged. With the implementation of the mitigation measures (Appendix C), adverse hazard and risk impacts as a result of the proposed activity are not considered to be significant.

6.11. Visual amenity

6.11.1. Existing environment

The existing visual landscape of the study area is predominantly characterised by distribution centres and industrial complexes to the north, east and south, and open fields located to the west. The existing substation is partially visible from Old Wallgrove Road and Lenore Drive.

The nearest residential dwelling is approximately 1.2 km southeast of the substation, located on Burley Road, Horsely Park.

6.11.2. Impact assessment

Construction

During construction, there would likely be minor visual impacts associated with the construction activities and the presence of construction vehicles, equipment, and plant, however, they would not be visible to residential receivers due to the distance and obstructed view. These activities may be partially visible to road users of Old Wallgrove Road and Lenore Drive. The implementation of mitigation measure VA1 in Appendix C would ensure visual impacts during construction works are minimised by removing all construction plant, equipment, waste, and excess materials from the site once construction activities have been completed.

Additionally, there would also be visual impacts to the aesthetic of the natural landscape of the study area resulting from vegetation removal and ground disturbance, however these visual impacts are expected to be minor and temporary as vegetation replanting and restoration of disturbed areas will be undertaken once construction works are complete (refer mitigation measure EC1 and EC4, Appendix C).

Operation

The bench extension, installation of one 330 kV switchbay and relocation of the No. 7 capacitor bank would be the primary additional visual element within the impact area. Whilst the proposed activity would increase the visual footprint of the substation, the proposed activity would be visually consistent with the existing infrastructure at the substation. In addition, due to the distance and obscured views of the bench extension and additional high voltage equipment (such as the new power transformer, relocation of the capacitor bank and new switchbays) from the nearest residential receivers, and as the study area is mostly surrounded by industrial complexes and distribution centres which are not visually sensitive receivers, it is unlikely that the proposed activity would result in any visual impacts to residential receivers.

With the implementation of the mitigation measures (Appendix C), adverse construction and operational impacts to visual amenity as a result of the proposed activity are not considered to be significant.

6.12. Waste

6.12.1. Existing environment

Waste material currently generated at the substation includes domestic garbage, wastewater from site amenities, redundant equipment and waste oils, and greases and lubricants from the maintenance of the

substation. Waste generation associated with the office premises includes domestic garbage, office supplies, and redundant electronics.

6.12.2. Impact assessment

Construction

Waste generation during the construction phase would typically include:

- Excavated spoil (with potential contamination from ACM)
- Existing steel fencing, due to the extension of the substation bench
- Waste metal and cabling
- Concrete
- Off-cuts and excess construction material
- Used, excess, or unsuitable erosion and sediment control structure materials
- Waste oils, greases, and lubricants from the maintenance of construction plant and equipment
- Domestic and putrescible waste (including food waste, bottles, cans, and paper)
- Redundant equipment (such as voltage transformers, current transformers, and circuit breakers which contain SF₆)
- Green waste from vegetation clearing and tree removal
- Transformer oil

The proposed activity would involve construction, removal and demolition works within the substation switchyard where ACM has been identified in existing conduits (including those under buildings and buried within moulded cement) and electrical components (Healthy Buildings International Pty Ltd 2025). All ACM identified within the impact area, including the switchyard, have been assessed as having a very low risk rating. The removal of materials/equipment/conduits with ACM or potential ACM would be carried out by a suitably qualified asbestos removal contractor and disposed of in accordance with the relevant legislation. Therefore, waste related impacts are considered to be minor and would be effectively managed by implementing the mitigation measures described in Appendix C.

Clean green waste from vegetation clearing and removal would be chipped, mulched, and reused on site for landscaping. Additionally, where applicable, suitable vegetation would be retained for habitat during site rehabilitation. Offsite beneficial reuse would be in accordance with the EPA mulch exemption, must pose minimal risk of the presence of physical and chemical contaminants and be in compliance with the *Biosecurity Act 2015*. Weed contaminated green waste would be disposed of offsite at a licenced waste management facility.

All waste generated during construction would be removed from the site or reused, where appropriate. Provided it is not contaminated, excavated material would be used for back-filling and any surplus material would be disposed of off-site to an appropriately licensed waste facility.

The management of construction waste would be undertaken in accordance with the mitigation measures outlined in Appendix C. Provided these measures are followed, impacts to the environment associated with improper management of waste are considered minor.

Operation

No change to existing waste streams is expected as part of the ongoing operation of the substation.

6.13. Social and economic considerations

6.13.1. Existing environment

The Sydney West 330 kV Substation forms an integral component in the electricity supply network in the Western Sydney Region. Employment in the surrounding areas is driven by distribution centres and industrial complexes with minimal residential development. The study area is part of the broader Western Sydney Employment Area, with transport, logistics, warehousing and office space businesses providing industry and employment in the Western Sydney region.

6.13.2. Impact assessment

Construction

During construction, the proposed activity may result in minor traffic, visual and noise related impacts to surrounding land occupiers. Impacts would be effectively managed by implementing the mitigation measures in Appendix C.

Due to the short duration of the proposed activity, there would be no long-term impacts on the local economy, and negligible impacts on social infrastructure or services in the region.

Operation

With the implementation of the mitigation measures (Appendix C), adverse social and economic impacts as a result of the proposed activity are not considered to be significant. The proposed activity will deliver a key positive benefit by supporting the continued reliability, capacity and security of electricity supply in the Western Sydney region. This aligns with the identified project need to maintain and enhance network performance, thereby supporting ongoing industrial and economic activity in the surrounding area.

6.14. Cumulative impacts

6.14.1. Existing environment

Cumulative impacts are incremental environmental impacts caused by the combination of past, present, and reasonably foreseeable future actions. Cumulative impacts accumulate overtime, from one or more sources. Whilst impacts may be insignificant in isolation, significant impacts may occur when individual effects are considered in combination.

A search of the NSW Department of Planning, Housing and Infrastructure (DPHI's) Major Projects website on 19 January 2026 found several major projects within 5 km of the study area (refer Table 6-2).

Table 6-2 Major projects proposed within 5 km of the study area

| Major Project | Proximity to Proposed Activity | Application Status | Construction Status |
|--|--------------------------------|--------------------|---------------------|
| NEXTDC S4 Data Centre Horsley Park SSD-63741210 | Within impact area | Determined (2025) | Commencing in 2026 |
| Project Atlas Data Centre Eastern Creek SSD-101067971 | Within study area | EIS preparation | Unknown |

| Major Project | Proximity to Proposed Activity | Application Status | Construction Status |
|--|--------------------------------|---------------------------|-------------------------------------|
| Oakdale East Industrial Estate (SSD-37486043) | 750 m northeast of study area | Determined (2023) | Stage 1 completed in September 2021 |
| Oakdale East Industrial Estate, Precinct 2 (SSD-77020757) | 750 m northeast of study area | Assessment | Unknown |
| Woolworths Chilled and Fresh Distribution Centre (SSD-49400209) | 2 km east of study area | Determined (2024) | Unknown |
| Lot 14A Warehouse and distribution centre (SSD-54822478) | 2.2 km east of study area | Determined (2024) | Commenced in December 2024 |
| Eastern Creek REP Throughput Increase | 2.2 km north of study area | Responding to submissions | Unknown |
| Horsley Park Bioenergy Facility (SSD-56517209) | 3.3 km east of study area | Determined (2025) | Unknown |
| Light Horse Interchange Warehouse - Lot 3 (SSD-67924472) | 3.5 km northeast of study area | Determined (2024) | Unknown |

6.14.2. Impact assessment

Cumulative impacts are incremental environmental impacts resulting from past, present, and reasonably foreseeable future actions. While impacts may be minor in isolation, they can become significant when considered together.

The assessment of cumulative impacts focused on the interactions between the proposed activity and other nearby projects, particularly when construction or operational periods overlap.

Construction

As stated in Table 6-2, there may be potential for cumulative impacts associated with increased traffic, airborne emissions, and visual impacts where construction for several major projects occur concurrently in close proximity to each other.

A review of the NEXTDC S4 Data Centre Horsley Park project (SSD-63741210) Submissions and Amendment Report (Urbis, 2025) has identified that the following portion of works will be occurring within the proposed works impact area:

- Extension of the existing substation bench to enable the construction of two new 330KV feeder bays including moving of the existing access road and fence line
- Extension to 330KV Busbar-B Section-2 at Sydney West Substation

- The construction of two new 330kV switchbays and associated primary and secondary equipment
- The construction of a new secondary systems building
- All required secondary systems work.

The approved footprint of the NEXTDC S4 Data Centre Horsley Park project, as obtained from Submissions and Amendment Report: NEXTDC S4 Data Centre, Horsley Park ((SSD-6374120) (Urbis, 2025), is shown in Appendix B.

Interaction between the NEXTDC S4 Data Centre Horsley Park project and the proposed works is expected as there is potential for construction timelines to overlap or occur consecutively in Quarter 3 2026 which may result in minor impacts associated with construction vehicles utilising the same major transport routes and access tracks.

The portion of proposed works that overlap with the NEXTDC S4 Data Centre Horsley Park project (i.e. bench extension) will not commence until the NEXTDC S4 Data Centre Horsley Park project has fully completed its activities within the shared impact area. With the implementation of mitigation measures in Appendix C, cumulative impacts during construction are expected to be minor and manageable.

Furthermore, Endeavour Energy is currently undertaking augmentation works within Transgrid's Sydney West 330 kV Substation. The works are described in the Feeder 22L Sydney West Change of Feeder Summary Environmental Report (Endeavour Energy, 2025) and include:

- Removal of three existing poles on Feeder 219 and installation of three new poles approximately 30 m northwest of the original location.
- Installation of new earthing on ground and carrying out associated overhead earthing work.
- Grass slashing to facilitate access around the poles, material laydown and temporary vehicular access track
- Tree trimming and removal.
- Open trenching and installing a new underground cable route to extend the existing 132kV feeder 22L to a new underground feeder bay within the Transgrid switchyard.
- Installation of a new joint feeder bay
- Cutting and removal of existing cable section between new joint bay and existing Transgrid feeder bay
- Removal of fence to connect new feeder to Transgrid feeder bay

The project is undertaken in response to Transgrid's proposed activity to ensure safety clearance between the proposed activity and the distribution poles. Interaction between Endeavour Energy's project and the proposed works is expected as there is potential for construction timelines to overlap or occur consecutively between Quarter 3 2026 and Quarter 3 2027. However, the portion of proposed works that overlap with Endeavour Energy's project (i.e. works occurring within the switchyard, drainage works and construction of access tracks) would not commence until Endeavour Energy has fully completed its activities within the shared impact area. With the implementation of mitigation measures in Appendix C, cumulative impacts during construction are expected to be minor and manageable.

Other projects listed in Table 6-2 may occur simultaneously with the proposed activity, however, most of these projects are generally localised developments within a specific land parcel, and given the distance between the locations of the major projects and the proposed activity, cumulative impacts are not expected to be significant and can be managed with the implementation of mitigation measures in Appendix C.

Operation

The proposed activity would not generate ongoing cumulative impacts during operation.

7. Consideration of statutory factors

7.1. Section 5.5 of the EP&A Act

Under Section 5.5 of the EP&A Act, the determining authority (being Transgrid) has a duty to consider the effect of the proposed activity on the environment and the effects on any wilderness areas. Table 7-1 provides a summary of how each factor has been considered.

Table 7-1 Consideration of Section 5.5 of the EP&A Act

| Factor | Comment |
|--|---|
| 5.5 (1). Examine and take into account matters affecting or likely to affect the environment by reason of that activity. | All potential environmental impacts have been considered and assessed in Section 6. |
| 5.5 (3). Consider the effect of an activity on any wilderness area (within the meaning of the <i>Wilderness Act 1987</i>) in the locality in which the activity is intended to be carried on. | The proposed activity would not affect any wilderness areas. |

7.2. Section 171 of the EP&A Regulation

The *Guidelines for Division 5.1 assessments* and Section 171(2) of the EP&A Regulation details environmental factors that must be taken into account when considering the likely impact of an activity on the environment. Table 7-2 provides a summary on how each environmental factor has been considered.

Table 7-2 Consideration of Section 171(2) factors

| Factor | Potential impact |
|--|---|
| (a) any environmental impact on a community. | During construction, there would be potential impacts on the community through increased traffic, noise, dust and visual impacts. These impacts would be minor, temporary and managed appropriately through the implementation of mitigation measures. |
| (b) any transformation of a locality. | The proposed works would not transform the locality, as works would be limited to the existing Sydney West Substation property boundary, and would be consistent with the existing land use. |
| (c) any environmental impact on the ecosystems of the locality. | The proposed activity is unlikely to significantly affect any flora and fauna species, including any ecosystems. The proposed activity would require vegetation removal (including the removal of up to 35 trees) to facilitate bench extension, stormwater drain diversion, establishment of a laydown area, and construction of access tracks to allow vehicle access to the site and laydown area. |
| (d) any reduction of the aesthetic, recreational, scientific or other environmental quality. | During construction, the proposed activity would be confined to Transgrid's existing property boundary. As such, construction works are expected to have a negligible impact on the |

| Factor | Potential impact |
|---|--|
| | <p>aesthetic and environmental quality of the surrounding area. No impact on scientific or recreational quality would occur.</p> <p>The equipment on the proposed bench extension would be visually consistent with the existing substation, with views obscured by vegetation and distance to sensitive receivers.</p> |
| (e) any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations. | The proposed activity would not affect any known Aboriginal or non-Aboriginal heritage items or sites. |
| (f) any impact on the habitat of protected animals (within the meaning of the <i>Biodiversity Conservation Act 2016</i>). | Impact to the habitats of any protected fauna is unlikely as the trees and grass proposed to be removed do not form part of any TECs and are not known to provide habitat to any endangered or threatened flora or fauna species (refer to Section 6.4, Appendix A and Appendix D). Furthermore, the removed trees would be replanted upon completion of construction works (refer to Appendix C). |
| (g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air. | The proposed activity is unlikely to endanger any species of animal, plant, or other form of life, whether living on land, in water or in the air. |
| (h) any long-term effects on the environment. | The proposed activity would not result in any long-term impacts on the environment as the substation would continue to operate in a similar manner to which it currently does. |
| (i) any degradation of the quality of the environment. | The proposed activity would occur within the highly disturbed area of the existing switchyard and adjoining predominantly cleared land subject to the proposed bench extension. The environmental assessment in Section 6 has demonstrated that the proposed activity would not result in any significant degradation to the quality environment. |
| (j) any risk to the safety of the environment. | There would be a minor risk to the environment from potential oil and chemical spills during construction and continued operation of the substation. These risks would be minimised through the spill oil containment system currently in use at the substation and can also be managed by implementing the mitigation measures outlined in Appendix C. |
| (k) any reduction in the range of beneficial uses of the environment. | The proposed activity would not result in a reduction of the range of beneficial uses of the environment. |
| (l) any pollution of the environment. | During construction, potential pollution may occur from an increase in vehicle emissions, noise, dust generation, oil and chemical spills, and waste |

| Factor | Potential impact |
|--|---|
| | generation. There is also a minor risk for unplanned releases of SF ₆ gas. These impacts would be adequately managed through the implementation of the mitigation measures outlined in Appendix C. |
| (m) any environmental problems associated with the disposal of waste. | The proposed activity is not expected to result in any environmental problems associated with the disposal of waste during construction or operation, provided all waste is adequately classified and managed in accordance with the mitigation measures in Appendix C. |
| (n) any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply. | There would be no increase in demand on resources that are, or are likely to become, in short supply. |
| (o) any cumulative environmental effect with other existing or likely future activities. | The removal of select trees within the impact area is expected to have a negligible impact on the broader environment. As per mitigation measure EC4 in Appendix C, replacement tree planting would be undertaken once construction works are complete. Two trees shall be planted for each <i>Angophora floribunda</i> (Rough-barked Apple) tree removed and rehabilitation shall be undertaken for an equivalent area to that of <i>Casuarina glauca</i> (Swamp Oak) trees removed, where feasible and appropriate within the surrounding landscape. Provided the mitigation measures in Appendix C are implemented, the proposed activity would not result in significant cumulative impacts when considered in conjunction with other existing or future developments (refer to section 6.14). |
| (p) any impact on coastal processes and coastal hazards, including those under projected climate change conditions. | The proposed activity is not located within a coastal area, and as such would not affect any coastal processes or coastal hazards, including those projected under climate change conditions. |
| (q) applicable local strategic planning statements, regional strategic plans or district strategic plans made under the Act, Division 3.1. | The proposed activity is located in an area subject to the Blacktown Local Strategic Planning Statement 2020. The proposed activity aligns with this plan by contributing to long-term sustainability goals and providing electricity supply to the region. |
| (r) other relevant environmental factors. | All other relevant environmental factors have been considered within Section 6 of this REF. |

7.3. Section 171A of the EP&A Regulation

Section 171A of the EP&A Regulation outlines environmental matters that must be taken into account when considering the likely impact of a proposed activity within a regulated catchment (being Sydney Drinking Water Catchment, Sydney Harbour Catchment, Georges River Catchment and Hawkesbury-Nepean Catchment).

No works would be carried out within a regulated catchment and therefore Section 171A has not been considered further.

7.4. Matters of National Environmental Significance (MNES) under the EPBC Act

Under the EPBC Act, Transgrid is required to consider matters of national environmental significance (MNES), to assist in determining whether the proposed activity should be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water. Table 7-3 provides a summary of how MNES have been considered.

Table 7-3 MNES under EPBC Act

| MNES / Commonwealth Land | Potential impact |
|---|--|
| Any impact on a World heritage property? | The proposed activity would not impact any World heritage properties. |
| Any impact on a National heritage place? | The proposed activity would not impact any National heritage places. |
| Any impact on any wetlands of international importance? | The proposed activity would not impact any wetlands of international importance. |
| Any impact on a Commonwealth listed threatened species or ecological communities? | A desktop ecological due diligence assessment prepared for the proposed activity determined that impacts to Commonwealth listed threatened species or ecological communities are unlikely, provided the mitigation measures in Appendix C are implemented. |
| Any impacts on a Commonwealth listed migratory species? | A desktop ecological due diligence assessment prepared for the proposed activity determined that impacts to Commonwealth listed migratory species are unlikely. |
| Any impact on a Commonwealth marine area? | The proposed activity would not impact any Commonwealth marine areas. |
| Any impact on the Great Barrier Reef Marine Park? | The proposed activity would not impact the Great Barrier Reef Marine Park. |
| Does the proposed activity involve a nuclear action (including uranium mines)? | The proposed activity does not involve a nuclear action. |
| Does the proposed activity involve a water resource, in relation to unconventional gas development and large coal mining development? | The proposed activity would not involve a water resource in relation to unconventional gas development or large coal mining development. |
| Is the proposed activity likely to have a significant impact on the environment on Commonwealth land? | The proposed activity is not likely to significantly impact the environment on Commonwealth land. |

7.5. Consideration of Ecologically Sustainable Development

Obligations under the EP&A Act require that Transgrid protects the environment by conducting its operations in compliance with the principles of ecologically sustainable development (ESD), namely:

- The precautionary principle
- Intergenerational equity

- Conservation of biological diversity and ecological integrity
- Improved valuation, pricing and incentive mechanisms.

The principles of ESD have been applied during the proposed activity design and assessment. Mitigation measures (Appendix C) would be applied to avoid or minimise impacts.

8. Environmental management

Transgrid is committed to carrying out its activities and services, including the proposed activity, in a manner that minimises pollution and environmental impacts, and complies with relevant legislation, industry standards and codes of practice. To support this commitment, Transgrid maintains an Environmental Management System (EMS) that is certified under the international standard ISO 14001. All works undertaken for the activity would be consistent with the EMS. Environmental mitigation measures have been included in Appendix C to avoid and minimise environmental impacts identified in this REF.

A Construction Environmental Management Plan (CEMP) shall be prepared and submitted to an Environment Business Partner/ Delivery for review and endorsement four weeks prior to the commencement of works, including site establishment. The CEMP shall be prepared in accordance with Transgrid's *Preparation and Approval of Environmental Management Plans* Procedure.

In addition to the Contractor's Environmental Supervisor, Transgrid shall appoint an Environmental Business Partner to regularly check that the proposed activity is being carried out in compliance with all environmental approval and legislative conditions.

The operation of the activity would be managed in accordance with Transgrid's certified Environmental Management System. Due diligence environmental checks, including environmental information generated from GIS where relevant, would be undertaken before any maintenance works are carried out. No new environmental constraints or mitigation measures have been identified as part of this REF that are relevant to the ongoing operation and maintenance of the asset.

9. Conclusion

The Sydney West 330 kV Substation – New No. 6 Transformer Installation project has been assessed under Part 5, Division 5.1 of the EP&A Act. This REF has examined and taken into account matters affecting or likely to affect the environment by reason of the proposed activity, including consideration of other NSW and Commonwealth legislation. The REF has considered and assessed environmental impacts in accordance with Section 171 of the EP&A Regulation.

The key environmental impacts identified as part of this REF include:

- Minor impacts to biodiversity resulting from vegetation clearing and removal of trees.
- Minor erosion and sedimentation impacts from excavation and ground disturbance activities during construction.
- Minor temporary construction noise impacts generated from construction plant and vehicles.
- Minor temporary increase in traffic movements on the surrounding road network, not anticipated to impact the safety and function of the road network.
- Minor temporary air quality impacts generated from excavation activities, and construction plant and vehicles.
- Minor temporary visual impacts during excavation and construction activities.
- Minor permanent visual impacts from the relocation of No. 7 330 kV Capacitor Bank to the new bench extension.
- Waste generation during construction, including green waste, asbestos, concrete, lead, waste oil, and potentially hazardous material (including ACM and SF₆) during the construction works.

Mitigation measures to avoid, minimise and/or manage potential environmental impacts for the proposed activity have been included in Appendix C.

Considering the assessment of the impacts detailed in this REF and the accompanying Ecology Due Diligence Field Assessment (Appendix D) and Noise Impact Assessment (Appendix E), it is concluded that:

- the proposed activity is not likely to significantly affect the environment and therefore an Environmental Impact Statement is not required.
- the proposed activity is not likely to significantly affect threatened species, ecological communities or their habitats and would not be carried out in a declared area of outstanding biodiversity value, therefore a Species Impact Statement (SIS) and/or Biodiversity Development Assessment Report (BDAR) is not required.

10. References

ARPANSA (2010) Guidelines for Limiting Exposure to EMF

Department of Environment and Climate Change (2008a) Managing Urban Stormwater: Soil and Construction Volume 2A – Installation of Services

Department of Environment and Climate Change (2008b) Soils and Construction Volume 2C Unsealed Roads

Department of Environment and Climate Change (2009) Interim Construction Noise Guideline

Endeavour Energy (2025) Summary Environmental Report (SER) Feeder 22L Sydney West Change of Feeder

Environment Protection Authority (2014) Waste Classification Guidelines

Environment Protection Authority (2015a) Guidelines on the Duty to Report Contamination

Environmental Protection Authority (2017) Noise Policy for Industry

Healthy Buildings International (2025) Hazardous Material Assessment Report: Sydney West Substation (330KV / 132KV / 18KV)

International Commissioning on Non-Ionizing Radiation Protection (2010) Guidelines for limiting exposure to time-varying electric and magnetic fields (1Hz – 100kHz)

Landcom (2004) Managing Urban Stormwater: Soil and Construction Volume 1

Practical Environmental Solutions (2014) Asbestos Register Review: Sydney West Substation

Transgrid (2020) Sydney West 330 kV Substation – Battery Energy Storage System (BESS) Installation Summary Environmental Report

Transgrid (2021) Sydney West 330 kV Substation - Switchbay Replacement Summary Environmental Report

Transgrid (2023) Standard Design Manual – Civil and Structures

Urbis (2025) Submissions and Amendment Report – NEXTDC S4 Data Centre, Horsley Park (SSD-63741210), prepared for NEXTDC LIMITED, 3 September 2025

WSP (2024) Sydney West 330 kV Substation – Operational Noise Assessment

| Scope of works | National Park | Ecology (500m) | Known heritage (100m) | | Aboriginal heritage due diligence assessment | | | | |
|----------------|---------------|---|-----------------------|--|--|-------------------|--------------------|-------------------|--------------------|
| | Type | Ecology constraint (and due diligence assessment) | Historic heritage | Aboriginal heritage | Site level of disturbance (LoD) | Work activity LoD | Matrix risk rating | TLF / FLF* (200m) | Further assessment |
| | | | | would not be impacted by the proposed activity. To further mitigate any impacts the mitigation measure HE2 shall be implemented. | | | | | |

Appendix B Figure



Figure B-1 Proposed scope of works

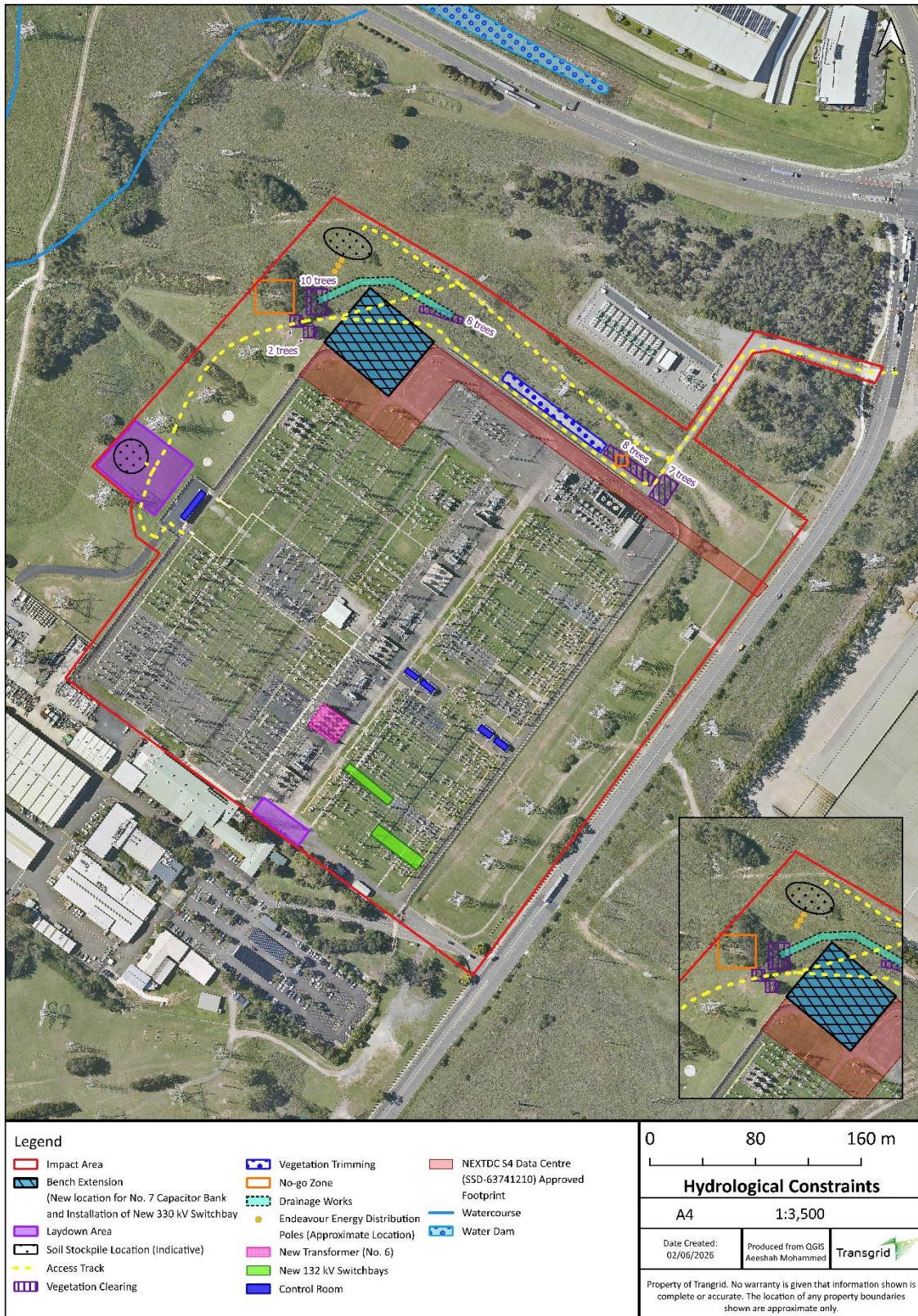


Figure B-2 Hydrological constraints

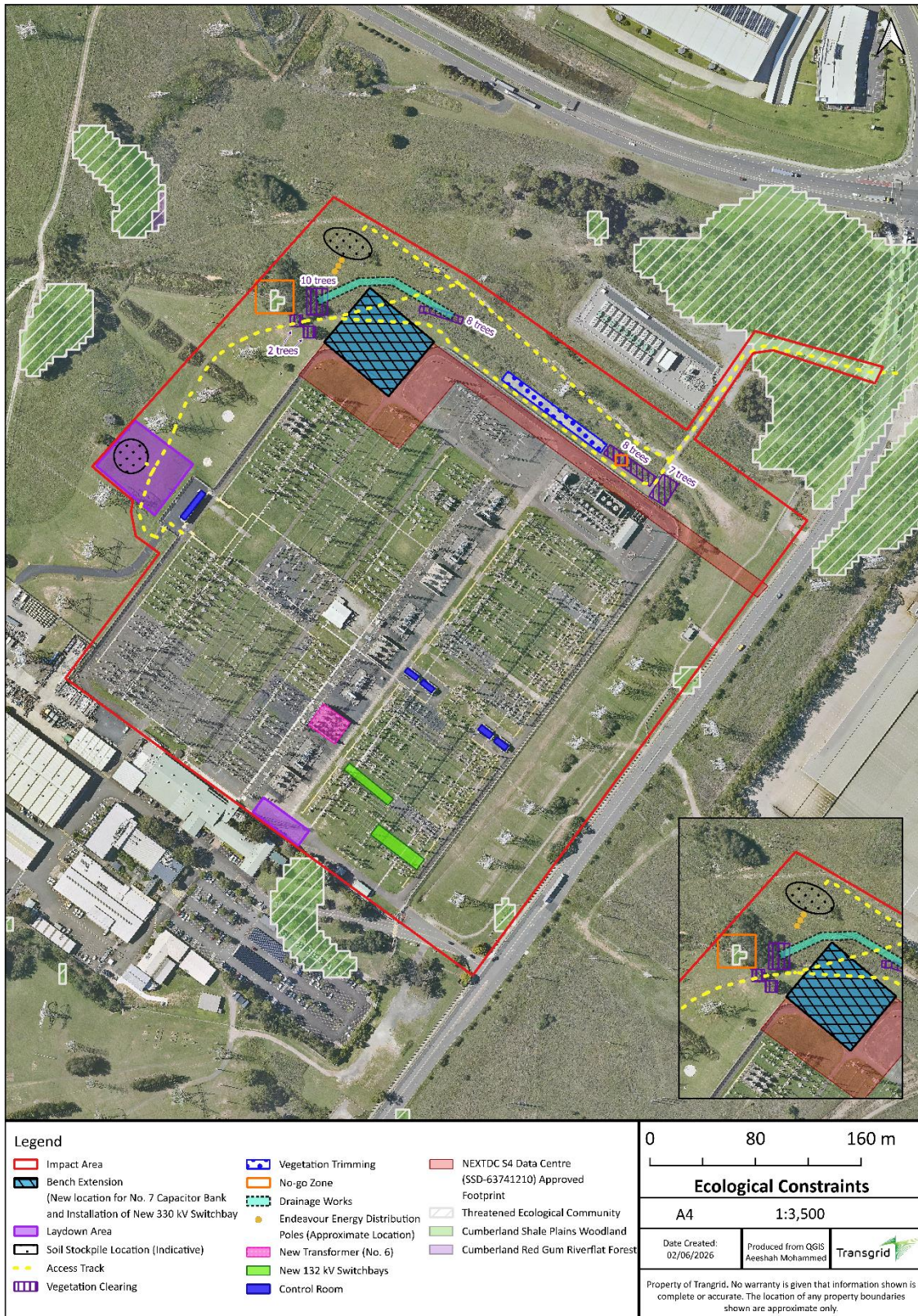


Figure B-3 Ecological constraints

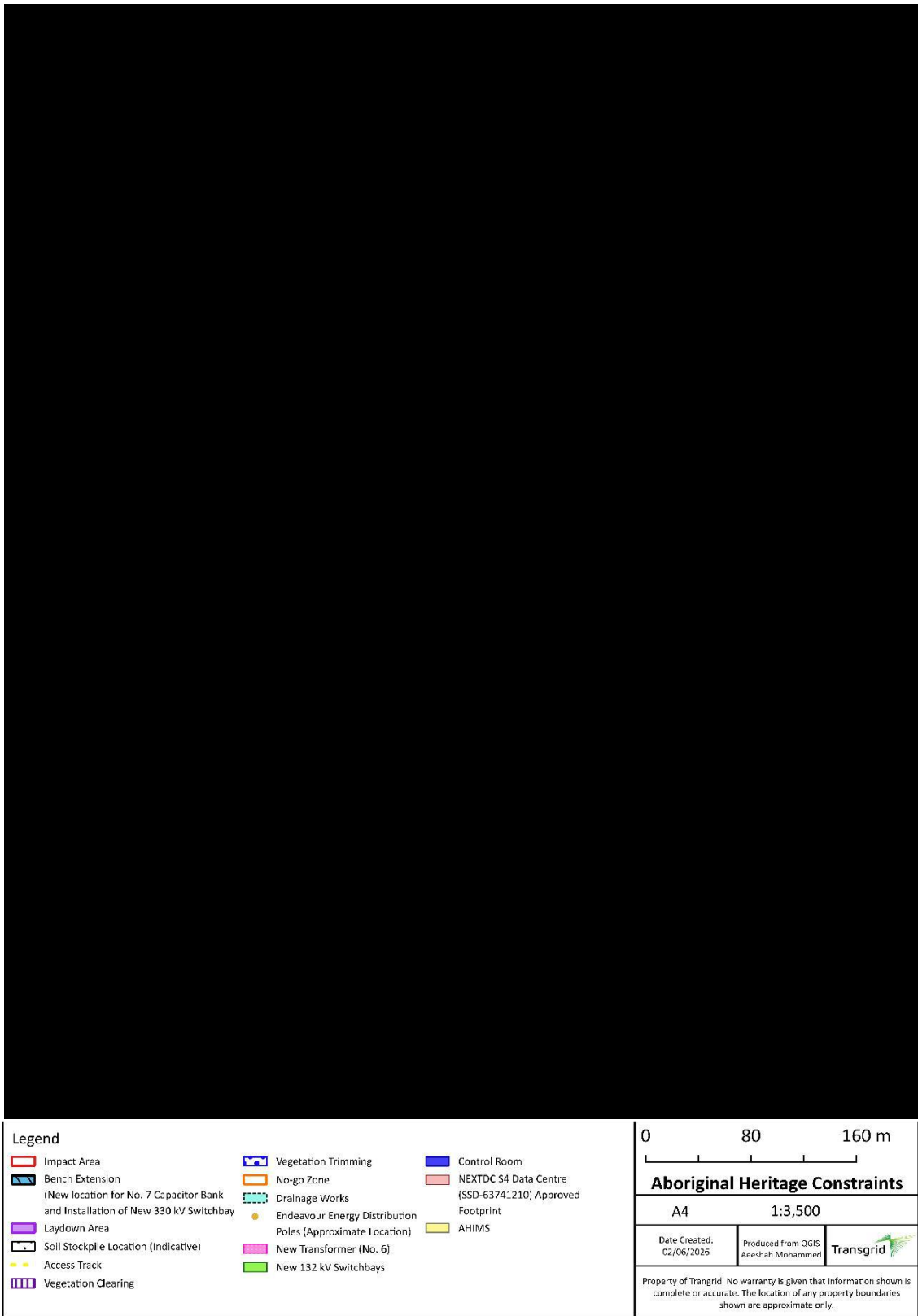


Figure B-4 Aboriginal heritage constraints

Appendix C Mitigation measures

| Mitigation measures | |
|--|--|
| Environmental management and incident response | |
| EM1 | <p>A Construction Environmental Management Plan (CEMP) shall be prepared and submitted to the Environment Business Partner/Delivery (Transgrid Environment Business Partner) for review and endorsement four weeks prior to the commencement of works, including site establishment.</p> <p>The CEMP shall be prepared in accordance with Transgrid's <i>Preparation and Approval of Environmental Management Plans</i> Procedure and include all environmentally sensitive areas identified in Appendix B. Where works are near identified sensitive areas, a specific site plan shall be prepared.</p> |
| EM2 | <p>All workers shall be inducted onto the CEMP, including the environmental mitigation measures and sensitive areas identified in this REF. Training shall be given to workers, as appropriate. Records shall be kept of this induction and training.</p> |
| EM3 | <p>An Environmental Supervisor shall be included as part of the construction staff to oversee implementation of the CEMP and ensure that all mitigation measures are effectively applied.</p> |
| EM4 | <p>All refuelling activities shall be within designated refuelling zones that are bunded and impervious. The location of the refuelling zones shall be shown on the site plans.</p> <p>Environmental spill kits containing spill response materials suitable for the works being undertaken shall be kept on site at all times and be used in the event of a spill. Any spills shall be contained, cleaned up promptly and immediately reported to the Transgrid site representative.</p> |
| EM5 | <p>All chemicals or other hazardous substances shall be stored in a bunded area and away from any drainage lines/pits. The capacity of the bunded area shall be at least 130% of the largest chemical volume contained within the bunded area. The location of the bunded enclosure/s shall be documented and shown on the site plans.</p> |
| Geology and soils | |
| GS1 | <p>A Soil and Water Management Plan (SWMP) shall be prepared by a suitably qualified and experience person and implemented and maintained in accordance with relevant sections of <i>Managing Urban Stormwater: Soil and Construction Volume 1</i> (Landcom, 2004) ('the Blue Book') (particularly Section 2.2) and <i>Managing Urban Stormwater: Soil and Construction Volume 2A – Installation of Services</i> (DECC, 2008a) and submitted to the Transgrid Environment Business Partner for endorsement prior to commencement of works.</p> |
| GS2 | <p>Vehicles and equipment shall remain on existing roads and nominated site access. Vehicles and equipment shall be free of mud, soil or vegetated matter prior to access onto public roads.</p> |
| GS3 | <p>Any imported fill shall be certified at source location (e.g. Quarrymaster or landholder) as pathogen and weed free Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM) in accordance with the Protection of the <i>Environment Operations Act 1997</i> (POEO Act) and the Waste Regulation.</p> |
| GS4 | <p>Any excavated material suspected of showing evidence of contamination shall be sampled and analysed by a National Association of Testing Authorities (NATA) Registered laboratory and managed in accordance with the <i>Waste Classification</i></p> |

| Mitigation measures | |
|-----------------------------|---|
| | <i>Guidelines</i> (EPA, 2014), the Guidelines on the Duty to Report Contamination (EPA, 2015) and the <i>Contaminated Land Management Act 1997</i> . |
| GS5 | The CEMP shall include an unexpected finds process that outlines how to identify and manage contaminated soils (including acid sulphate soils and naturally occurring asbestos), material and groundwater. |
| GS6 | An Asbestos Management Plan (AMP) shall be prepared by a suitably qualified specialist for works on known or potential asbestos containing material (ACM) in accordance with relevant SafeWork NSW guidelines. |
| GS7 | All oil handling shall be undertaken in accordance with <i>Transgrid's Oil Management Procedure</i> . |
| Hydrology and water quality | |
| HW1 | No refuelling or bulk herbicide preparation shall occur within 40 metres of natural or constructed drainage lines or water bodies. |
| HW2 | Water management for excavations shall be documented in the CEMP and implemented on-site. Controls may include: <ul style="list-style-type: none"> • Use of diversion drains (or similar) to reduce water flow into excavations and off-site. • Separation of clean and dirty water, where possible • Methodology for intercepted/collected water (e.g. regular monitoring, treatment and discharge). • Installation of appropriate erosion control devices (sediment fence, coir logs, sandbags, etc), including monitoring and maintenance. |
| HW3 | Spoil shall be stockpiled in a manner to avoid the possibility of sediments entering stormwater drains, waterways or migrating off-site. |
| Ecology | |
| EC1 | Vegetation disturbance and removal shall be minimised as far as practicable. |
| EC2 | All properties with known biosecurity issues shall be identified and included in the CEMP. Controls may include: <ul style="list-style-type: none"> • Wash down procedures to reduce the spread of weeds via vehicles and machinery. • Cleaning of vehicle tyres, undersides and radiator grills before leaving a property. • Cleaning of footwear and minimising soil movement between locations (either on machines, plant, equipment or materials). • Importing weed-free material. • Working from clean areas towards weedy areas to reduce the spread of weeds. • Selecting and using pesticides in accordance with <i>Transgrid's Use of Pesticides and Schedule of Approved Pesticides</i>. • Maintaining communication records with landowners regarding biosecurity requirements. |
| EC3 | Mitigation measures to manage the Critically Endangered Ecological Community (Cumberland Plain Woodland) identified in proximity to the existing and temporary access track and stormwater drain diversion works shall be outlined in the CEMP and include (but not be limited to): <ul style="list-style-type: none"> • The CEEC shall be marked in all site plans as a no-go zone prior to the commencement of works (including site establishment) |

| Mitigation measures | |
|---------------------|--|
| | <ul style="list-style-type: none"> The CEEC boundary shall be demarcated on site with tape where it is located immediately adjacent to the existing and temporary access tracks The CEEC shall be avoided at all times and not harmed |
| EC4 | <p>Tree removal shall be limited to the 35 trees indicated in Figure B-1 and Appendix D. Replacement tree planting shall be undertaken once construction works are complete at a suitable location within Transgrid property in consultation with Transgrid Environmental Business Partner, as follows:</p> <ul style="list-style-type: none"> Two trees shall be planted for each <i>Angophora floribunda</i> (Rough-barked Apple) tree removed. A compensatory planting ratio of 1:2 shall be undertaken for the Angophora trees, requiring the establishment of a minimum of four replacement Angophora trees using locally appropriate native species. Replanting or rehabilitation shall be undertaken for an equivalent area to that of <i>Casuarina glauca</i> (Swamp Oak) trees removed, where feasible and appropriate within the surrounding landscape. |
| EC5 | <p>No-go zones shall be established at areas occupied by threatened ecological communities (TECs) and <i>Eucalyptus tereticornis</i> trees that are being retained, as shown in Appendix B of this REF.</p> <p>The no-go zones shall be clearly demarcated in the CEMP and communicated to all construction staff as part of the site induction(s).</p> |
| Heritage | |
| HE1 | <p>In the event that a site or artefact (as defined by the <i>National Parks and Wildlife Act 1974</i> or <i>Heritage Act 1977</i>) is identified during construction works, works shall cease at the location and no further harm to the object shall occur. The find shall be immediately reported to Transgrid, and the regulator in accordance with legislation. No work shall commence in the vicinity of the find until any required approvals have been given by the regulator. In the event that skeletal remains are encountered during the activity, works shall stop immediately, the area secured to prevent unauthorised access and the NSW Police, Department of Planning, Housing and Infrastructure (DPHI) and Transgrid contacted.</p> |
| HE2 | <p>All staff and contractors shall be made aware of identified heritage sites [REDACTED] and [REDACTED]. These shall be shown on site plans as no-go areas.</p> |
| Noise and vibration | |
| NV1 | <p>Noise generating works shall be in accordance with the <i>Interim Construction Noise Guideline</i> (DECC, 2009):</p> <ul style="list-style-type: none"> 7:00am – 6:00pm Monday to Friday 8:00am – 1:00pm Saturdays No work on Sundays or Public Holidays. <p>Work outside normal hours, on Sundays and public holidays shall only comprise:</p> <ul style="list-style-type: none"> The delivery of materials outside normal hours requested by police or other authorities for safety reasons Emergency work to avoid the loss of lives and/or property Work timed to correlate with system planning outages Vacuum and oil filling of equipment <p>Other noise generating works outside of the standard construction hours shall require the prior formal written consent of Transgrid’s Environment Business Partner and require justification in accordance with the Guideline.</p> |

| Mitigation measures | |
|------------------------------------|--|
| NV2 | Construction equipment shall be maintained regularly as per manufacturer's recommendations and less noise-emitting equipment shall be selected where possible. |
| Traffic and access | |
| TA1 | Transportation and equipment delivery movements on public roads shall be in accordance with Transport for NSW and Council requirements. |
| TA2 | Traffic, transportation and access mitigation and management strategies shall be documented in the CEMP and implemented on-site. These may include: <ul style="list-style-type: none"> • The management of the delivery of equipment and materials. • Access to and from the site including nominated roads and site access tracks. • Parking. • Speed limits. |
| TA3 | Access track works shall be constructed in accordance with the <i>Soils and Construction Volume 2C Unsealed Roads</i> (DECC, 2008b). |
| Air quality | |
| AQ1 | Air quality mitigation and management strategies shall be documented in the CEMP and implemented on-site. This may include: <ul style="list-style-type: none"> • Avoiding vehicle and machinery idling as much as possible. • Reducing vehicle speeds when in the vicinity of residences to minimise the generation of nuisance dust. • Progressively revegetating and/or rehabilitating disturbed areas as works are completed. • Dust suppression including water spraying of unsealed surfaces, covering stockpiles and materials during transportation |
| Hazards and risk | |
| HR1 | All designs shall be in accordance with the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to EMF (ARPANSA, 2010). |
| HR2 | Transgrid's <i>Hot Works and Fire Risk Procedure</i> shall be adhered to for planning and undertaking all hot and fire risk works. This process shall be documented and implemented in accordance with the CEMP. |
| HR3 | All SF ₆ handling shall be undertaken in accordance with Transgrid's <i>Management of SF₆ Gas – Work Instruction</i> . |
| Visual amenity | |
| VA1 | All construction plant, equipment, waste and excess materials shall be contained within the designated boundaries of the work site and shall be removed from the site following the completion of construction. |
| Waste | |
| WA1 | Waste mitigation and management strategies shall be documented in the CEMP and be in accordance with Transgrid's Waste Management Procedures and associated Work Instructions. |
| Social and economic considerations | |

Mitigation measures

| | |
|-----|--|
| SE1 | Adjacent landholders shall be notified prior to the commencement of works and provided with relevant project updates throughout the construction period. |
|-----|--|

Appendix D Ecology Due Diligence Field Assessment

Ecology Due Diligence Field Assessment

Form

Use / directions

- This form is to be completed by an E5 Authorised Officer.
- For any assistance with completing this form, please contact an Environmental Business Partner.

Authorisation

| | | | |
|--------------------|---|------|------------|
| Project Name | Sydney West Substation - New No. 6 Transformer Installation | | |
| Project Number | P0024543-PT005927 | | |
| Authorised Officer | Jose Nascimento | Date | 29/05/2026 |

Description of work environment

| | | | | | |
|---|--|-----------|------------|----------|------------|
| Location of works (Line/Structure/Site) | Extension of the existing substation bench on the northwestern side | | | | |
| Land Use Description | Pasture, electrical and industrial infrastructure | | | | |
| Work Location LoD | Undisturbed | Minimally | Moderately | Highly | Completely |
| Work Activity LoD | Minimal | Low | Medium | Moderate | High |
| Proposed Activity / Disturbance Area (m ²) | Bench approx. 50 x 65 m in size, with additional battering and access track works to extend this area of impact. Proposed scope of works area is shown on Figure 1. | | | | |
| Desktop review – Threatened Species Description / Proximity | <p>A desktop review of available ecological databases did not identify any recorded threatened flora or fauna species within the immediate project area.</p> <p>A relatively small stand of the threatened ecological community (TEC) Cumberland Plain Woodland is located approximately 80 m to the northeast of the study area. According to the project REF, two Plant Community Types (PCTs) are present in proximity to, and partially within, the project area:</p> <ul style="list-style-type: none"> - PCT 3320 – Cumberland Shale Plains Woodland: This PCT is partially located within the area proposed for new drainage infrastructure and extends along the boundary of the existing access track from Old Wallgrove Road. - PCT 4025 – Cumberland Red Gum River-flat Forest: This PCT occurs approximately 80 m west of the proposed impact area. <p>Despite the mapped presence of these native vegetation communities, the study area is subject to ongoing vegetation management associated with Transgrid electrical infrastructure. This includes:</p> <ul style="list-style-type: none"> - maintenance of easement clearance requirements - regular mowing of grassed areas - vegetation trimming/removal to maintain safe asset operation and access | | | | |



| | | | | |
|----------------------------|---|-----------------|---------------------|-------|
| Landscape Slope | Flat | Gently inclined | Moderately Inclined | Steep |
| Vegetation Cover | Low | Moderate | High | |
| Overall Ecology assessment | <p>The surveyed area comprises a former grazing paddock characterised by a dense groundcover and an absence of exposed soil across most of the site. Vegetation is predominantly composed of introduced pasture species, interspersed with a range of common pasture weeds, indicative of a long history of agricultural use and ongoing disturbance.</p> <p>The site is largely open and devoid of significant tree cover, except for:</p> <ul style="list-style-type: none"> - <i>Casuarina glauca</i> located along the constructed waterway; - two isolated <i>Angophora floribunda</i> occurring within parts of the study area; and - isolated <i>Eucalyptus tereticornis</i> occurring along the access track. <p>These scattered native trees provide the only elements of vertical structure within an otherwise highly modified landscape.</p> <p>During the site inspection, kangaroos and rabbits were observed, with anecdotal evidence suggesting frequent utilisation of the area by these species. The adjacent constructed waterway is likely to support higher fauna abundance and diversity, providing a comparatively more suitable habitat corridor relative to the surrounding cleared and managed land.</p> <p>The inspected areas proposed to be impacted (identified in Figure 2 as Sites 1, 2 and 3) are predominantly dominated by exotic vegetation, reflecting ongoing disturbance and maintenance activities. An exception occurs at Site 2, where the presence of scattered Angophora and Casuarina trees contributes to marginally higher structural complexity and habitat value.</p> <p>Overall, the study area exhibits characteristics typical of a disturbed grazing and infrastructure corridor landscape within western Sydney, including:</p> <ul style="list-style-type: none"> - dominance of exotic grasses and weeds - limited native species diversity - low structural complexity - vegetation communities influenced by adjacent infrastructure and land management practices <p>The vegetation composition and condition are also consistent with disturbed and industrial-adjacent environments, where exotic species are prevalent and native vegetation is generally restricted to remnant trees or plantings associated with landscaping or infrastructure works.</p> <p>Given these factors, the ecological value of the site is assessed as low, with only localized pockets of slightly higher value associated with remnant native trees and the nearby waterway corridor.</p> | | | |
| Site Verification | | | | |
| Site 1 | | | | |
| Site ID: | Access track upgrade (vegetation trimming and removal) | | | |
| Site Description | <p>Site 1 encompasses an existing access track proposed to be upgraded to support the planned works. The extent of impact is illustrated in Figure 1, with:</p> <ul style="list-style-type: none"> - a purple dashed area indicating locations of tree removal; and - a blue dotted area identifying areas requiring tree trimming. | | | |

| | |
|-----------------------------|--|
| | <p>The site is situated adjacent to and partially aligned with a drainage line, which supports a dense infestation of <i>Acacia saligna</i> (Golden Wreath Wattle). This species forms a dominant mid-storey layer along the drainage corridor and contributes to the overall modified condition of the site.</p> <p>The ground layer is dominated by exotic pasture grasses, including:</p> <ul style="list-style-type: none"> - <i>Chloris gayana</i> (Rhodes Grass) - <i>Setaria spp.</i> (Pigeon Grass) - <i>Eragrostis curvula</i> (African Lovegrass) <p>Exotic herbaceous species recorded within the site include:</p> <ul style="list-style-type: none"> - <i>Verbena bonariensis</i> - <i>Bidens pilosa</i> <p>These species are typical of disturbed and maintained environments and reflect ongoing land management associated with the infrastructure corridor.</p> <p>A small number of <i>Lomandra longifolia</i> individuals were observed along the drainage line. These are considered likely to be the result of previous landscaping or revegetation efforts, rather than naturally occurring remnant vegetation.</p> <p><i>Acacia saligna</i> is recognised as a weed species of concern. It was previously listed in the Greater Sydney Regional Strategic Weed Management Plan 2017–2022 and, although not retained in the 2023–2027 revision, continues to be identified as a weed species by the Sydney Weeds Network, of which Blacktown City Council is a member.</p> <p>A single juvenile <i>Eucalyptus tereticornis</i> (Forest Red Gum) was identified within the site. Consultation with the construction team confirmed that this individual can be retained in situ during the proposed works. The tree location is shown in Figure 3, and appropriate protection measures (e.g. flagging or exclusion fencing) can be implemented by the EBP.</p> <p>Overall, Site 1 is characterised by:</p> <ul style="list-style-type: none"> - highly modified vegetation - dominance of exotic and invasive species - limited native species presence - low habitat value, aside from minor features associated with the drainage line |
| Threatened Species Presence | <p>No threatened flora or fauna species were recorded within the study area during the assessment.</p> <p>The vegetation present does not meet the characteristics of the Plant Community Types present near the project area, due to the dominance of exotic species and highly modified condition.</p> |
| Site 2 | |
| Site ID: | Drainage line realignment, access to the northwest portion of the project. |
| Site Description | <p>Site 2 comprises the proposed bench extension area and associated drainage realignment works. The extent of impact is shown in Figure 1.</p> <p>The site exhibits a vegetation pattern consistent with the surrounding landscape, being dominated by improved pasture species and common pasture weeds.</p> <p>The canopy layer within the impact area includes:</p> <ul style="list-style-type: none"> - <i>Casuarina glauca</i> (Swamp Oak), occurring as a dense clump along the drainage line. Approximately 100 m² of <i>Casuarina glauca</i> vegetation associated with the drainage line realignment will require removal; and |

| | |
|-----------------------------|---|
| | <p>- <i>Angophora floribunda</i> (Rough-barked Apple), with two mature individuals identified for removal as part of the proposed works.</p> <p>The drainage line and surrounding areas are heavily impacted by invasive weed species, including:</p> <ul style="list-style-type: none"> - <i>Lycium ferocissimum</i> (African Boxthorn) - <i>Solanum pseudocapsicum</i> - <i>Asparagus asparagoides</i> (Bridal Creeper) - <i>Araujia sericifera</i> (Moth Vine) <p>These species are indicative of disturbance and contribute to the degraded ecological condition of the site.</p> <p>A visual inspection of the trees proposed for removal did not identify any hollows, stick nests, or other significant habitat features that would indicate use by hollow-dependent fauna or nesting species at the time of assessment.</p> <p>A designated “no-go zone”, shown as an orange box in Figure 1, is located adjacent to the impact area. This zone contains two <i>Eucalyptus tereticornis</i> (Forest Red Gum) individuals, which will not be impacted by the proposed works.</p> <p>Overall, Site 2 is characterised by:</p> <ul style="list-style-type: none"> - predominantly exotic groundcover - scattered native trees and planted vegetation - heavily weed-infested drainage features - low to moderate ecological value locally, with slightly elevated value associated with mature native trees and drainage line vegetation |
| Threatened Species Presence | No threatened flora or fauna species were recorded within the study area during the assessment. |
| Site 3 | |
| Site ID: | Stockpile location |
| Site Description | <p>Site 3 was identified following on-site consultation with the construction team and comprises a proposed stockpile location. The site is situated within a regularly maintained grassed area, subject to ongoing mowing and vegetation management.</p> <p>The vegetation within Site 3 is expected to be consistent with surrounding areas, being dominated by exotic pasture grasses with very limited native species presence. The maintained condition of the site results in low structural diversity and minimal habitat value.</p> <p>A clump of <i>Acacia saligna</i> (Golden Wreath Wattle) is present adjacent to the proposed stockpile area. These plants were initially considered for retention; however, based on field inspection and confirmation of their weed status (as discussed in the Site 1 description), they are now considered suitable for removal as part of the proposed works.</p> <p>No other native vegetation or habitat features of ecological significance were identified within the proposed impact area.</p> <p>Overall, Site 3 is characterised by:</p> <ul style="list-style-type: none"> - highly modified and maintained vegetation - dominance of exotic grass species - presence of invasive woody weeds (<i>Acacia saligna</i>) - low ecological value and limited habitat function |

| | |
|-----------------------------|--|
| Threatened Species Presence | <p>No threatened flora or fauna species were recorded within the study area during the assessment.</p> <p>The vegetation present does not meet the characteristics of the Plant Community Types present near the project area, due to the dominance of exotic species and highly modified condition.</p> |
|-----------------------------|--|

Assessment of Impact within proposed works area

| | |
|---|---|
| <p>Recommended mitigation controls to be implemented for works to proceed</p> | <p>The proposed removal of vegetation within the defined work areas is assessed as having a negligible impact on the broader ecological values of the site, given its highly modified condition, the dominance of exotic species.</p> <p>Within Site 1, vegetation identified for trimming may be more appropriately removed in full, as it is largely comprised of weedy species, including <i>Acacia saligna</i>, which do not provide significant ecological value. A single juvenile <i>Eucalyptus tereticornis</i> has been identified within this area and must be retained. This individual should be clearly delineated prior to the commencement of works through flagging or temporary fencing.</p> <p>At Site 2, the removal of two <i>Angophora floribunda</i> trees and approximately 100 m² of <i>Casuarina glauca</i> associated with the drainage realignment is considered acceptable given the context of the works and the modified condition of the site. To offset this loss, a compensatory planting ratio of 1:2 is recommended for the <i>Angophora</i> trees, requiring the establishment of a minimum of four replacement trees using locally appropriate native species. In addition, replanting or rehabilitation should be undertaken for an equivalent area to that of <i>Casuarina glauca</i> removed, where feasible and appropriate within the surrounding landscape.</p> <p>For Site 3, the proposed stockpile area may be expanded to include the removal of adjacent exotic and weedy woody vegetation, <i>Acacia saligna</i>, which will contribute to improved site management and reduce the ongoing burden of weed control.</p> <p>Across all works areas, no-go zones—including those containing retained <i>Eucalyptus tereticornis</i>—should be clearly demarcated prior to construction, and all activities must be confined to the approved disturbance footprint. Standard erosion and sediment control measures should also be implemented and maintained, particularly in proximity to drainage lines, to prevent off-site impacts.</p> <p>Overall, considering the managed grazing and infrastructure context of the site, the low ecological value of the impacted areas, and the absence of threatened species or suitable habitat, the proposed works are considered appropriate to proceed, subject to the implementation of the mitigation measures outlined above.</p> |
|---|---|

| | |
|---------|---|
| Figures | Attach all photos and site diagrams as evidence |
| 1 to 4 | Site maps |
| 5 to 12 | Photos from site walkover |



Figure 1: Map showing broader work area and location of bench extension

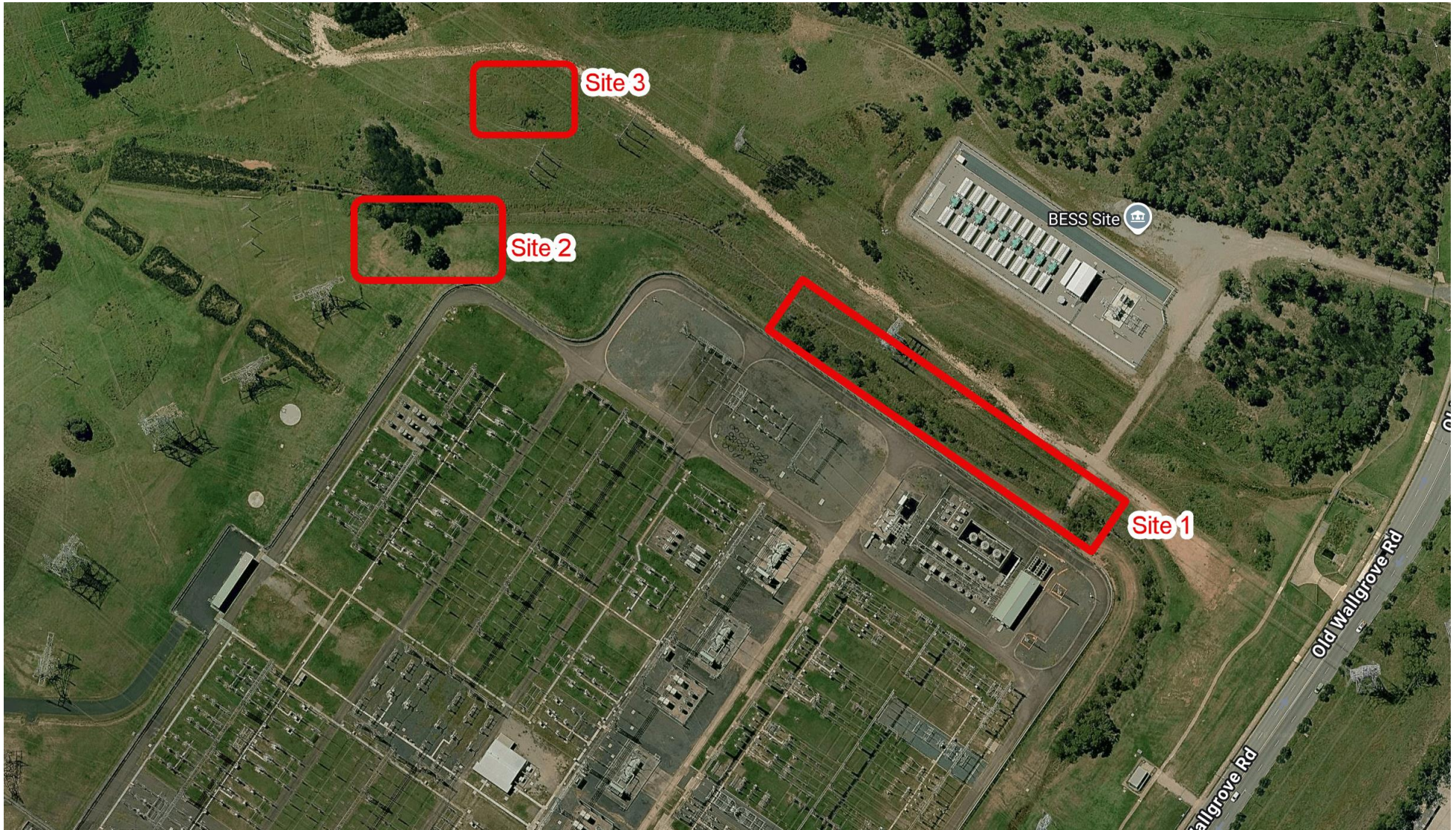


Figure 2: Sites visited in this Field Assessment

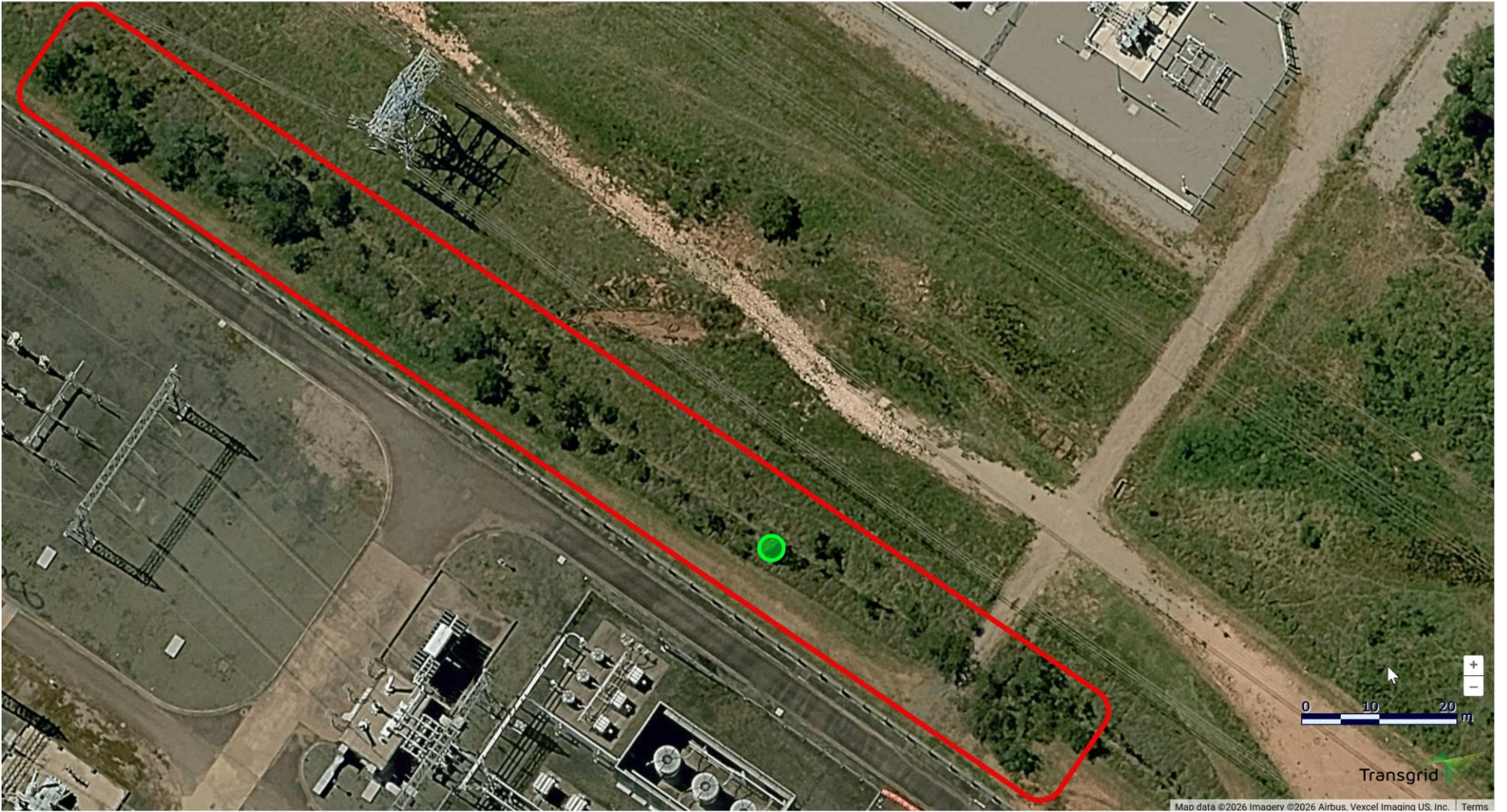


Figure 3: Site 1 and Eucalyptus tree to be retained location



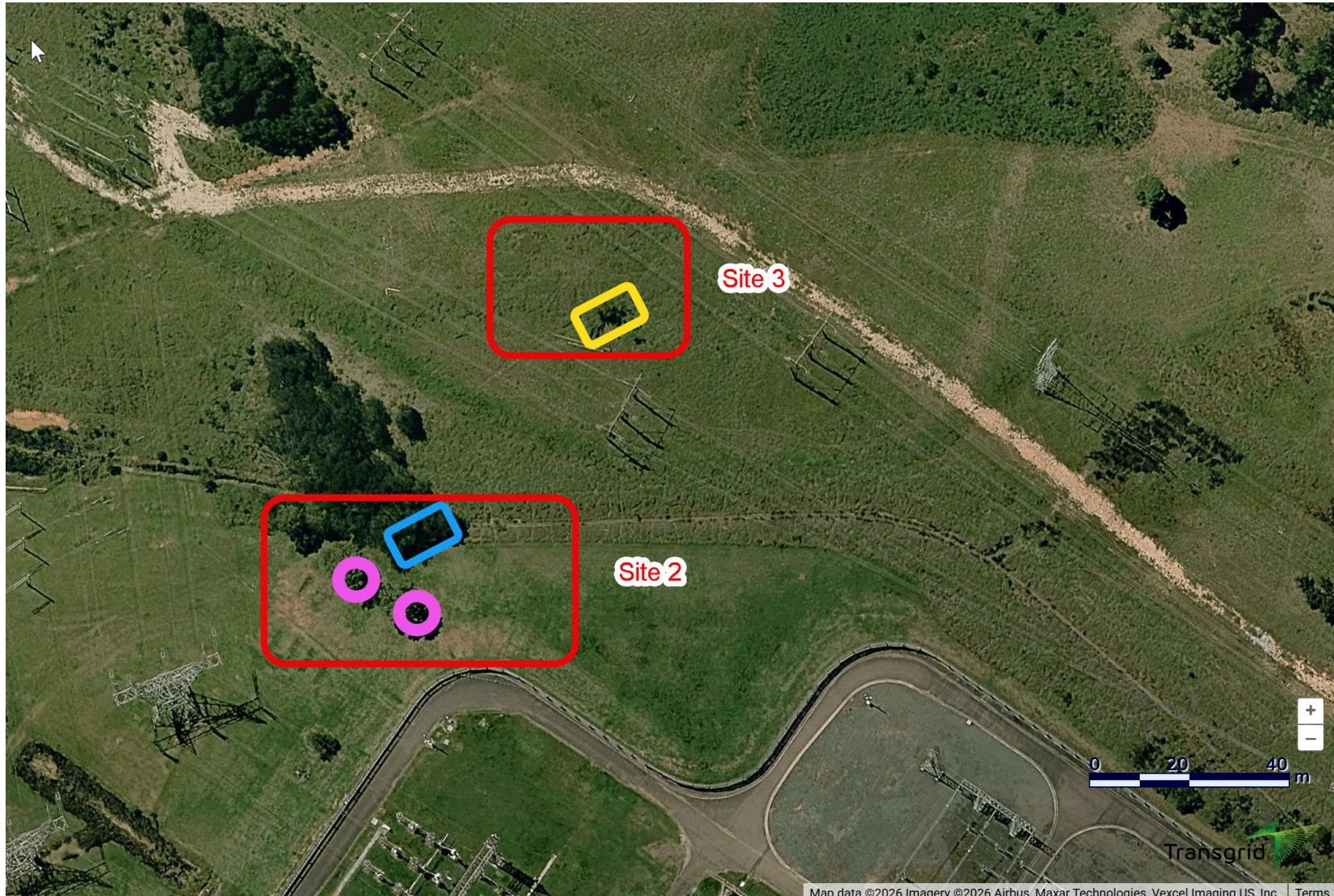


Figure 4: Two mature trees (marked in **purple**) are proposed for removal. *Casuarina* trees to be removed are shown in **blue**. Areas of **woody weedy vegetation** that may be removed within Site 3 are indicated in **yellow**.



Figures 5 and 6: Site 1 photos.



Figure 7 and 8: Site 1. Eucalyptus tree to be retained and GPS location.



Figure 9 and 10: Site 2 photos.



Figure 11 and 12: Site 3 photos and woody weeds to be removed in red



Appendix E Noise Impact Assessment

Transgrid

November 2024

Confidential

Sydney West 330kV Substation

Operational Noise Assessment

wsp



Question today Imagine tomorrow Create for the future

Sydney West 330kV Substation Operational Noise Assessment




Transgrid

WSP

Level 3, 51-55 Bolton St
Newcastle NSW 2300
PO Box 1162
Newcastle NSW 2300

Tel: +61 2 4929 8300
Fax: +61 2 4929 8382
wsp.com

| Rev | Date | Details |
|-----|------------|-------------------------------|
| 0 | 28/11/2024 | Draft issue for client review |
| 1 | 4/12/2024 | Final issue |

| | Name | Date | Signature |
|--------------|------------|-----------|--|
| Prepared by: | N. Roberts | 4/12/2024 |  |
| Reviewed by: | B. Ison | 4/12/2024 |  |
| Approved by: | B. Ison | 4/12/2024 |  |

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

This document may contain confidential and legally privileged information, neither of which are intended to be waived, and must be used only for its intended purpose. Any unauthorised copying, dissemination or use in any form or by any means other than by the addressee, is strictly prohibited. If you have received this document in error or by any means other than as authorised addressee, please notify us immediately and we will arrange for its return to us.

Table of contents

| | |
|---|----------|
| Glossary..... | iii |
| 1 Project introduction | 1 |
| 1.1 Project description | 1 |
| 1.2 Purpose of this report | 1 |
| 1.3 Previous assessments..... | 1 |
| 2 Existing environment..... | 2 |
| 2.1 Noise study area..... | 2 |
| 2.2 Noise sensitive receivers..... | 2 |
| 2.3 Existing background noise levels | 1 |
| 2.4 Noise Catchment Areas | 1 |
| 3 Acoustic legislation and guidelines..... | 2 |
| 3.1 Noise Policy for Industry | 2 |
| 3.1.1 Project intrusiveness noise level..... | 2 |
| 3.1.2 Project amenity noise levels | 3 |
| 3.1.3 Indicative Project noise trigger levels..... | 3 |
| 3.1.4 Modifying factors for annoying characteristics | 4 |
| 3.1.5 Maximum noise level assessment and sleep awakening..... | 5 |
| 3.1.6 Effects of meteorology on noise levels | 6 |
| 4 Operational noise assessment..... | 7 |
| 4.1 Substation noise monitoring..... | 7 |
| 4.1.1 Assessment of annoying characteristics | 7 |
| 4.2 Modelling methodology | 7 |
| 4.3 Modelled noise levels..... | 8 |
| 4.4 Model validation | 9 |
| 4.5 Predicted operational noise levels | 10 |
| 4.6 Discussion | 1 |
| 5 Conclusions | 2 |
| 6 Limitations | 3 |
| 6.1 Permitted purpose..... | 3 |
| 6.2 Qualifications and assumptions | 3 |
| 6.3 Use and reliance | 3 |



| | | |
|-----|------------------|---|
| 6.4 | Disclaimer | 4 |
|-----|------------------|---|

Glossary

| | |
|--------------------------|---|
| Acoustic barrier | Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc used to reduce noise, without eliminating it. |
| Ambient noise | The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far. |
| Assessment period | The period in a day over which assessments are made. |
| Audible range | The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 hz to 20 khz, although it is possible for some people to detect frequencies outside these limits. |
| Background noise | Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the a-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below). |
| Decibels (dB) | <p>The level of noise is measured objectively using a sound level meter.</p> <p>The range of pressure variations associated with everyday living may span over a range of a million to one. Instead of expressing pressure in this enormous range of unit, it is convenient to condense this range to a logarithmic scale and give it the units of decibels.</p> <p>The following are examples of the decibel readings of every day steady or quasi-steady sounds:</p> <p><i>20db quiet bedroom at night or recording studio</i></p> <p><i>30db quiet library or quiet location in the country</i></p> <p><i>40db living room</i></p> <p><i>50db typical office or ambience in the city at night</i></p> <p><i>60db normal conversational speech</i></p> <p><i>70db a car passing by</i></p> <p><i>80db kerbside of a busy road</i></p> <p><i>90db truck passing by</i></p> <p><i>100db nightclub</i></p> <p><i>110db rock band or 2m from a jackhammer</i></p> <p><i>120db 70m from a jet aircraft</i></p> <p><i>140db 25m from a jet aircraft</i></p> |
| dBA: A-weighted decibels | The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the ‘A’ filter. A sound level measured with this filter switched in is denoted as dB(A). Most environmental noise is measured using the ‘A’ filter. |
| dBC: C-weighted decibels | ‘C’ weighted adjustments are relatively flat across lower frequencies, and as such are better suited for the assessment of low frequency noise. |

| | |
|--|---|
| Frequency | The time rate for each wave peak (of a sound wave) to pass a given point. Frequency is measured in hertz (Hz). |
| L ₉₀ | The level of noise exceeded for 90% of the time for which a given sound is measured. The bottom 10% of the sample is the L ₉₀ noise level expressed in units of dB(A). |
| L _{eq} | Equivalent sound pressure level – the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. The sound weighting of the noise measurement is commonly added, for example L _{Aeq} or L _{Ceq} . |
| Rating Background Level (RBL) | Defined by the NSW EPA as the median value of the (lower) tenth percentile of L ₉₀ ambient background noise levels for day, evening or night periods, measured over a number of days during the monitoring period |
| Reflection | Sound wave changed in direction of propagation due to a solid object obscuring its path. |
| Sound level meter | An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels. |
| Sound pressure level (L _p) | The level of sound pressure at a specific location, expressed in decibels. |
| Sound Power Level (L _w) | A measure of the acoustic energy emitted from a source of noise, expressed in decibels. |

1 Project introduction

1.1 Project description

A planned project at the Transgrid Sydney West 330 kV Substation (the Project) requires the installation of a new 375 MVA 330/132 kV transformer, the relocation of the existing #7 330 kV capacitor bank, and additional auxiliary works. The proposed new transformer will be located in the existing substation yard, whilst the new capacitor bank will be located on a new bench, forming an extension of the current substation yard. Any potential construction noise from the additional auxiliary works is not assessed in this report.

WSP has been commissioned by Transgrid to prepare a noise study to determine the existing noise level at the substation to verify current impacts, and the impact of the proposed substation configuration. Circuit breaker noise will also be assessed in this report.

1.2 Purpose of this report

This Noise Impact Assessment (NIA) has been prepared by WSP and has the following objectives:

- Consideration of the existing noise environment (Section 2)
 - Determination of the assessment objectives in accordance with the relevant policies and guidelines (Section 3)
 - Verification of existing, and assessment of potential, operational noise impacts from the new equipment and existing circuit breakers (Section 4).
-

1.3 Previous assessments

An operational noise assessment was conducted in October 2019 by ERM (the ERM Report) which assessed the impact of the installation of a battery energy storage system (BESS) on surrounding noise sensitive receivers. This will form the basis of noise-sensitive receiver selection, as outlined in Section 2.2.

2 Existing environment

2.1 Noise study area

The Project is located in Eastern Creek, NSW, approximately 35 km south-west of the Sydney CBD. The location of the Project, background noise monitoring locations, and representative receivers is provided in Figure 2.1.

The area surrounding the Project is predominantly industrial, comprising primarily of large sheds and distribution centres. There is a suburban residential area located approximately 1.5 km to the north-west of the Project in the suburb of Erskine Park, and the semi-rural residential suburb of Horsley Park is approximately 1.3 km to the south-east of the Project.

The existing noise environment in the surrounding area is dominated by heavy vehicle traffic noise on Lenore Drive and Old Wallgrove Road, with additional environmental noise from wildlife, such as birds and insects.

2.2 Noise sensitive receivers

A total of 12 representative noise sensitive receivers were assessed in the study area. The residential receivers have been replicated as close as reasonably practicable from the ERM Report for the purposes of comparability. However, due to the changes in industrial infrastructure in the surrounding area, the industrial and commercial receivers have been updated, and the ID for each receiver has also been updated. The details of each noise sensitive receiver are presented in Table 2.1.

Table 2.1 Representative noise sensitive receivers

| Receiver ID | Noise Catchment Area (NCA) | Address | Receiver type | Approximate distance from substation boundary (m) |
|-------------|----------------------------|-----------------------------------|---------------|---|
| R01 | NCA 1 | 62 Weaver Street, Erskine Park | Residential | 1,600 |
| R02 | NCA 1 | 5 Cetus Place, Erskine Park | Residential | 1,450 |
| R03 | NCA 1 | 6 Millner Avenue, Horsley Park | Industrial | 800 |
| R04 | NCA 1 | 6 Millner Avenue, Horsley Park | Industrial | 660 |
| R05 | NCA 1 | 6 Millner Avenue, Horsley Park | Industrial | 560 |
| R06 | NCA 2 | 319 Burley Road, Horsley Park | Residential | 1,200 |
| R07 | NCA 2 | 198-222 Burley Road, Horsley Park | Residential | 1,350 |
| R08 | NCA 2 | 146 Burley Road, Horsley Park | Residential | 1,360 |
| R09 | NCA 1 | 10 Roberts Road, Eastern Creek | Industrial | 165 |
| R10 | NCA 1 | 2/4 Roberts Road, Eastern Creek | Commercial | 270 |
| R11 | NCA 1 | 2 Telopea Place, Eastern Creek | Commercial | 270 |
| R12 | NCA 1 | 1 Telopea Place, Eastern Creek | Commercial | 190 |

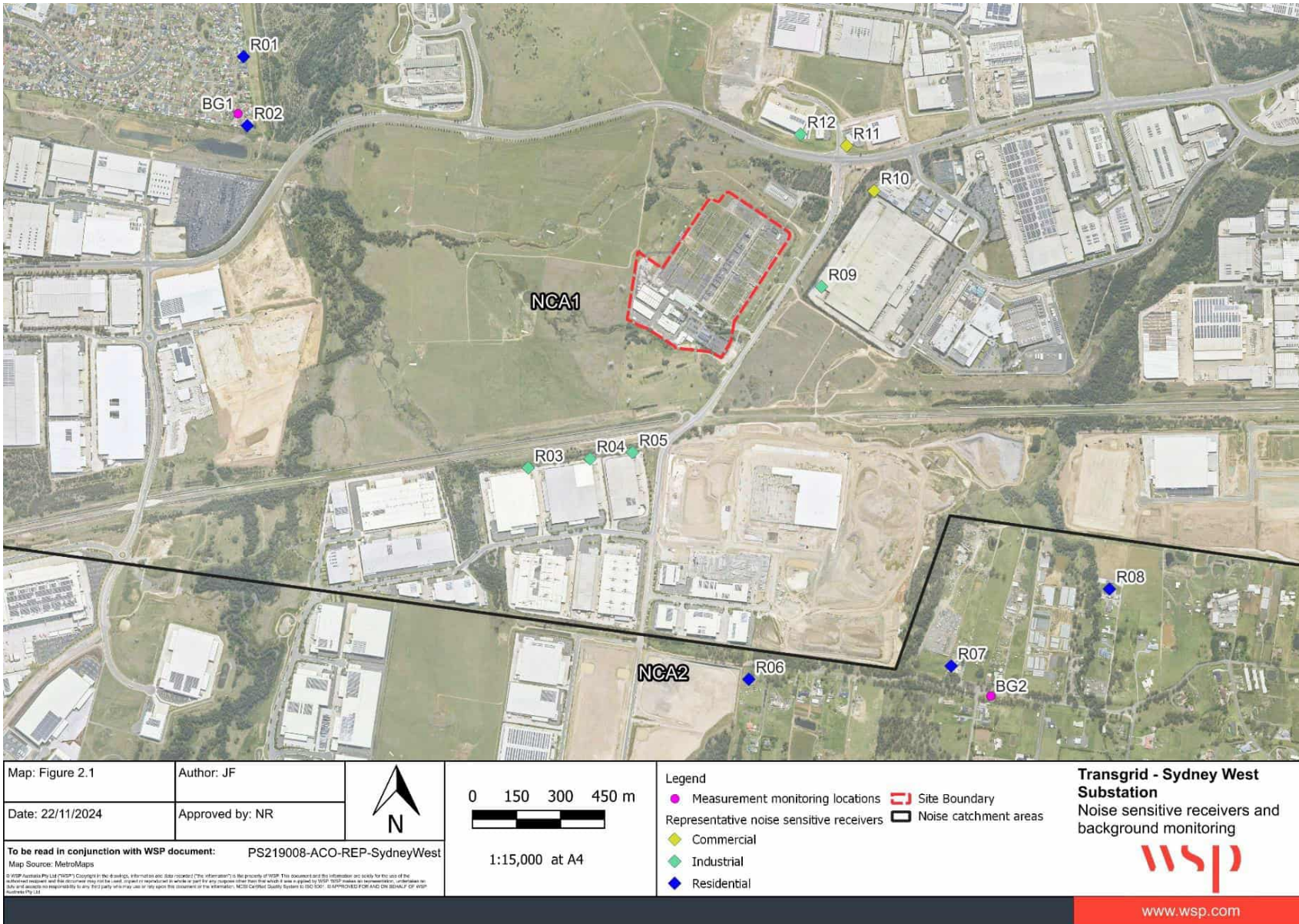


Figure 2.1 Noise sensitive receivers and background monitoring locations

2.3 Existing background noise levels

Short term monitoring was undertaken to confirm existing background noise levels at locations representative of the surrounding noise sensitive receivers.

Monitoring of background noise levels was conducted during the day and night periods, and due to the lower background noise levels and typically steady state of the noise sources, night-time is likely to be the most sensitive time period. It is noted that the substation was inaudible during all attended monitoring sessions, and detailed analysis of the results confirmed that the substation did not have a significant contribution to the measured noise levels. Results of the monitoring of background noise levels are presented in Table 2.2.

Table 2.2 Summary of background noise monitoring results

| Location | Time | L _{eq} dBA | L ₉₀ dBA | Observations |
|----------|----------------------------------|---------------------|---------------------|--|
| BG1 | Day: 5 November 2024, 2:15 pm | Day: 52 | Day: 48 | Constant road traffic noise from Lenore Drive, nearby occasional road traffic noise, and typical environmental noise (wind, birds, insects, dogs etc.). Substation inaudible (day and night). |
| | Night: 5 November 2024, 11:05 pm | Night: 40 | Night: 37 | |
| BG2 | Day: 12 March 2024, 3:03 pm | Day: 65 | Day: 47 | Distant road traffic noise from M7 and Lenore Drive, nearby occasional road traffic noise, and typical environmental noise (wind, birds, insects, dogs etc.). Substation inaudible (day and night). |
| | Night: 5 November 2024, 10:30 pm | Night: 46 | Night: 39 | |

2.4 Noise Catchment Areas

Noise Catchment Areas (NCAs) have been defined to classify groups of sensitive receivers that are likely to have a similar existing noise environment and experience similar impacts from the project. NCAs were determined through reference to aerial imagery and land-use maps and verified during the noise monitoring program.

The NCAs for the study area are described in Table 2.3 and shown in Figure 2.1.

Table 2.3 Noise catchment areas

| NCA | Representative monitoring location | Description of region |
|-------|------------------------------------|--|
| NCA 1 | BG1 | Erskine Park semi-urban residential area and Eastern Creek industrial area |
| NCA 2 | BG2 | Horsley Park semi-rural residential area |

3 Acoustic legislation and guidelines

3.1 Noise Policy for Industry

Assessment of on-site noise sources is guided by the Noise Policy for Industry (NPfI), which is applicable to industrial noise sources from activities such as the proposal, under Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act).

The NPfI is used to calculate Project Noise Trigger Levels (PNTLs). These are planning levels and in the absence of an Environmental Protection Licence (EPL) for the site, do not form mandatory limits. They do however provide guidance on the likely acceptability of predicted noise levels and will assist the determining authority to assess operational noise impacts. As these criteria have not been calculated in strict accordance with the NPfI methodology and are not strictly relevant to this project, they will be referred to as Indicative Project Noise Trigger Levels (IPNTLs).

Where noise criteria are predicted to be exceeded, feasible and reasonable noise mitigation strategies should be considered. Feasible and reasonable noise mitigation measures should consider the economic, social and environmental costs and benefits of the development against the noise impacts.

It is noted that the ERM report contains IPNTLs which were calculated using monitoring data obtained during an earlier report (date not specified). As the area surrounding the project has been the subject of substantial development over recent years, it is considered suitable to calculate new IPNTLs based on more current background noise levels. As outlined in section 2.3, the substation and BESS were not audible at the monitoring locations at the time of measurements and as such these levels are considered suitable for use to calculate IPNTLs.

The assessment procedure for industrial noise sources outlines two components:

- controlling intrusive noise impacts in the short-term for residences
- maintaining noise level amenity for particular land uses for residences and other land uses.

In assessing the noise impact of industrial sources, both components must be taken into account for residential receivers. The minimum values of each of these components will form the project trigger levels for the industrial source under assessment. As the substation facility operates 24 hours a day, the night-time criteria are likely to be the controlling time criteria.

3.1.1 Project intrusiveness noise level

The project intrusiveness noise level for residential receivers is set at 5dB above the determined rating background level (RBL) for the area. The formula defining the project intrusiveness noise levels from short-term monitoring is summarised below.

$$\text{dBA } L_{\text{eq}; 15 \text{ minute}} \leq \text{Rating Background Level (L}_{90}) + 5 \text{ dBA}$$

As background noise levels during the evening period were not recorded, the night-time criteria will be conservatively assumed for this period. Additionally, it is noted that in the absence of long-term monitoring data, calculations are based on L_{A90} noise statistics, rather than the RBL, however they are considered indicative of likely RBLs. The determined intrusiveness levels presented in Table 3.1.

Table 3.1 Established Project Intrusiveness Noise Level

| Noise catchment area | Time Period ¹ | Measured L_{90} dBA (RBL) | Project intrusiveness noise level (RBL + 5 dBA) |
|----------------------|--------------------------|-----------------------------|---|
| NCA1 | Day | 48 | 53 |

| Noise catchment area | Time Period ¹ | Measured L ₉₀ dBA (RBL) | Project intrusiveness noise level (RBL + 5 dBA) |
|----------------------|--------------------------|------------------------------------|---|
| | Evening | 37 ² | 42 ² |
| | Night | 37 | 42 |
| NCA2 | Day | 47 | 52 |
| | Evening | 39 ² | 44 ² |
| | Night | 39 | 44 |

(1) Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and public holidays; evening: the period from 6 pm to 10pm; night: the remaining periods.

(2) Night-time criteria conservatively adopted

3.1.2 Project amenity noise levels

To limit continuing increases in ambient noise levels (i.e. background noise level creep), the maximum amenity noise level within an area from industrial noise sources should not normally exceed the amenity noise levels prescribed in the NSW NPfL.

The recommended amenity noise levels represent the objective for total industrial noise at a receiver location, whereas the project amenity noise level represents the objective for noise from a single industrial development at a receiver location. To ensure that a single industrial noise source does not increase the total industrial noise levels in the area above the recommended levels the criteria is set at 5 dBA below the recommended amenity noise level.

The amenity criteria have been established at the identified residential receivers near the Project based on the anticipated designation of “suburban residential” land use at receivers. The established amenity criteria applicable to the Project are presented in Table 3.2.

Table 3.2 Established Project Amenity Noise Level

| Location | Type of Receiver | Recommended amenity noise level (ANL) dBA L _{eq,period} ¹ | Project amenity noise level (ANL -5 dB) dBA L _{eq,period} ¹ | Project adjusted ANL dBA L _{eq,period} ¹ | | |
|-------------------------|------------------------|---|---|--|---------|-------|
| | | | | Day | Evening | Night |
| R01, R02, R06, R07, R08 | Residential – suburban | Day: 55 Evening: 45 Night: 40 | Day: 50 Evening: 40 Night: 35 | 50 | 40 | 35 |
| R10, R11 | Commercial premises | 65 ² | 60 ² | 60 ² | | |
| R03, R04, R05, R09, R12 | Industrial premises | 70 ² | 65 ² | 65 ² | | |

(1) Day: the period from 7 am to 6 pm Monday to Saturday; or 8 am to 6 pm on Sundays and public holidays; evening: the period from 6 pm to 10 pm; night: the remaining periods

(2) When in use

3.1.3 Indicative Project noise trigger levels

In assessing the noise impact of the proposal on surrounding residential receivers, both the intrusiveness and amenity criterion must be considered. In most cases, the lowest of these two goals will become the limiting criterion and form the IPNTLs for the industrial source under assessment.

As the intrusiveness criterion applies to a 15-minute period and the amenity criterion applies to the entire period consideration needs to be made to short term fluctuations in noise impacts. To standardise the time periods, a conversion to allow the amenity criterion to be assessed for a 15-minute period the NPfI requires adding 3dB to the $L_{eq \text{ period}}$ amenity level. This conversion between $L_{eq \text{ period}}$ and $L_{eq \text{ 15 min}}$ is shown below.

$$L_{eq \text{ 15min}} = L_{eq \text{ period}} + 3 \text{ dB}$$

A summary of all relevant $L_{eq,15min}$ goals is presented in Table 3.3.

Table 3.3 Summary of Indicative Project Noise Trigger Levels (IPNTL)

| Location | Assessment/ receiver type | Indicative Project noise trigger levels dBA $L_{eq,15 \text{ min}}$ | | |
|----------|----------------------------|---|----------------------|--------------------|
| | | Day ¹ | Evening ¹ | Night ¹ |
| NCA1 | Intrusiveness | 48 | 37 | 37 |
| | Amenity | 53 | 43 | 38 |
| | IPNTL – Residential | 48 | 37 | 37 |
| NCA2 | Intrusiveness | 47 | 39 | 39 |
| | Amenity | 53 | 43 | 38 |
| | IPNTL – Residential | 47 | 39 | 38 |
| All NCAs | IPNTL - Commercial | 60² | | |
| | IPNTL - Industrial | 65² | | |

(1) Day: the period from 7.00 am to 6.00 pm Monday to Saturday; or 8.00 am to 6.00 pm on Sundays and public holidays; evening: the period from 6.00 pm to 10.00 pm; night: the remaining periods.

(2) When in use

As discussed in Section 3.1, **these goals do not form mandatory limits**, however, provide guidance on the likely acceptability of predicted noise levels.

3.1.4 Modifying factors for annoying characteristics

Certain noise characteristics have a higher potential to cause annoyance, generally requiring additional considerations. Tonality, low frequency emphasis and intermittency are generally considered to be attention-drawing and can cause greater disturbance. On the other hand, short-term single noise events are likely to be less disturbing and may warrant some relaxation in the applicable noise criteria.

Table C1 from the NPfI prescribes the appropriate corrections required for annoying characteristics of noise, and the relevant entries of which has been reproduced and summarised in Table 3.4.

Table 3.4 Summary of relevant corrections for annoying characteristics

| Factor | Assessment/measurement | When to apply | Correction ¹ |
|---------------------|--|---|-------------------------|
| Tonal noise | One-third octave band analysis using the objective method for assessing the audibility of tones in noise – simplified method (ISO1996.2-2007 – Annex D). | Level of one-third octave band exceeds the level of the adjacent bands on both sides by: <ul style="list-style-type: none"> - 5 dB or more if the centre frequency of the band containing the tone is in the range 500–10,000 Hz - 8 dB or more if the centre frequency of the band containing the tone is in the range 160–400 Hz - 15 dB or more if the centre frequency of the band containing the tone is in the range 25–125 Hz. | 5 dB ² |
| Low-frequency noise | Measurement of source contribution C-weighted and A-weighted level and one-third octave measurements in the range 10– 160 Hz | Measure/assess source contribution C- and A-weighted $L_{eq,T}$ levels over same time period. Correction to be applied where the C minus A level is 15 dB or more and: <ul style="list-style-type: none"> - where any of the one-third octave noise levels in Table C2 are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period. - where any of the one-third octave noise levels in Table C2 are exceeded by more than 5 dB and cannot be mitigated, a 5-dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2- dB(A) positive adjustment applies for the daytime period. | 2 or 5 dB ² |

1) Corrections to be added to the measured or predicted levels, except in the case of duration where the adjustment is to be made to the criterion.

2) Where a source emits tonal and low-frequency noise, only one 5 dB correction should be applied if the tone is in the low-frequency range, that is, at or below 160 Hz.

3.1.5 Maximum noise level assessment and sleep awakening

The potential for impacts from maximum noise level events and sleep awakening impacts due to operations during the night-time period is detailed in the NPfI. Specifically for the Project, this includes the operation of circuit breakers. As such an event is infrequent and almost instantaneous, the maximum noise level event criteria for operational noise within the project area is the following:

- L_{Fmax} 52 dBA, or the rating background level plus 15 dB, whichever is greater.

Based on the measurements detailed in Section 3.1.1, external maximum noise level event criteria are presented in Table 3.5. As indicated in Section 3.1.1, in the absence of long-term monitoring data, calculations are based on L_{A90} noise statistics, rather than the RBL, however they are considered indicative of likely RBLs.

Table 3.5 Sleep awakening criteria

| Noise catchment area | Location | Assessment | L_{Fmax} criteria dBA |
|----------------------|---------------------------|---------------------------------|-------------------------|
| NCA1 | All residential receivers | Base criteria | 52 |
| | | L_{A90} plus 15 dB | 52 |
| | | Sleep awakening criteria | 52 |
| NCA2 | All residential receivers | Base criteria | 52 |
| | | L_{A90} plus 15 dB | 54 |
| | | Sleep awakening criteria | 54 |

3.1.6 *Effects of meteorology on noise levels*

For the purposes of this assessment, neutral and worst-case meteorological conditions were considered. This includes atmospheric stability class of D and winds of 0 ms^{-1} from source to receiver for neutral conditions, and an atmospheric stability class of F and winds of 2 ms^{-1} from source to receiver for worst case conditions. Where noise impacts are predicted under these situations, further assessment may be required.

4 Operational noise assessment

4.1 Substation noise monitoring

Attended noise measurements were conducted on the Project site to determine the Sound Power Level (L_w) of existing noise-generating equipment. In order to allow the validation of the noise model, and hence demonstrate the accuracy of the predicted noise levels, additional measurements were taken around the boundary of the Project. The location of these measurements is outlined in Appendix B, along with the general site layout and location of existing noise generating equipment.

Due to the complex nature of BESS noise generation and the interaction of multiple on-site noise sources, the measurement methodology for the BESS was in general accordance with *ISO 8297-1994: Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment – Engineering method*. An overview of measurement locations is shown in Appendix B.

Multiple on-site equipment was noted as being inaudible or indiscernible from the substation noise environment including equipment such as certain auxiliary transformers, and some capacitor banks and associated reactors. Only equipment that was clearly audible during the measurement period is included in Table 4.2 and Appendix B.

It was observed throughout the measurement period that the L_{Aeq} noise sources within the substation were all of steady nature with no short-term peaks. The recorded L_{max} levels were higher than L_{Aeq} levels, despite the short measurement periods (where the peak noise value would be expected to be similar to the L_{Aeq} noise level). This was a result of extraneous noise sources (road traffic, wildlife) rather than the substation itself.

It was also observed that the BESS fan speed varied greatly from unit to unit throughout the monitoring period. The measurements for this equipment were taken during a period when all fans were perceived as being approximately equal speed. Transgrid were unable to confirm the fan speed as a percentage of load due to technical limitations.

Attended noise monitoring was undertaken using a NTi XL-2 handheld sound level meter (S/N 17705). The units were calibrated, and certificates can be provided upon request.

The results of this monitoring are presented in Appendix A, and these results were processed in accordance with *AS2374.6-1994: Power transformers - Determination of transformer and reactor sound levels*, to calculate the L_w for each noise generating equipment, as summarised in Table 4.2.

4.1.1 Assessment of annoying characteristics

Electrical substations often exhibit a dominant low frequency or tonal noise characteristic. The attended noise monitoring data at the nearest noise sensitive receivers has been reviewed in detail, using the collected L_{Amin} data to account for any intermittent noise affecting the L_{Aeq} results. Tonal characteristics were measured at most locations, and the overall site is assumed to be the source of tonal noise. Therefore a 5 dB penalty was added to all modelled operational noise scenarios to account for annoying characteristics of noise. Detailed 1/3 octave noise monitoring results are provided in Appendix A.

4.2 Modelling methodology

Noise modelling was conducted to determine the predicted level of operational noise at the identified noise sensitive receivers surrounding the Project. Modelling was undertaken within SoundPLAN modelling software and utilised the inputs in Table 4.1.

Table 4.1 Noise modelling assumptions

| Modelling element | Input/assumption/source reference |
|--------------------------------------|--|
| Noise Model | SoundPLAN (Version 8.2) |
| Ground elevation geometry | NSW SIX Maps |
| Ground absorption | 75% soft ground for all areas outside substation boundary 10% soft ground for substation site |
| Assessment standard | CONCAWE noise prediction algorithm. |
| Weather conditions | Neutral and noise-enhancing meteorological conditions as per NPFI methodology. |
| Receiver locations | Representative noise sensitive receivers identified in Figure 2.1, and detailed in Section 2.2. |
| Receiver height | 1.5 m |
| Site buildings and blast/noise walls | Footprints from aerial imagery and heights estimated from site visit. |

Two separate scenarios have been included in the modelling as follows:

- Existing substation layout and noise sources for comparison with monitored noise levels to confirm if the site is currently compliant with the relevant noise goals (model validation).
- Inclusion of the new transformer, with associated noise walls and relocated #7 330 kV capacitor bank (future scenario). This is to determine potential noise impacts with the replacement/addition of the aforementioned equipment.

4.3 Modelled noise levels

The L_w for the existing equipment, as they were operating during the monitoring period, were calculated using the measured data outlined in Section 4.1 and are provided in Table 4.2.

Table 4.2 Modelled validation equipment sound power levels

| Equipment | L_w dBA $L_{eq}(15 \text{ minute})$ |
|--------------------------|---------------------------------------|
| #1 Transformer | 91 |
| #2 Transformer | 77 |
| #3 Transformer | 90 |
| #4 Transformer | 84 |
| #5 Transformer | 93 |
| #1 Auxiliary transformer | 70 |
| #3 Auxiliary transformer | 68 |
| #4 Auxiliary transformer | 70 |
| SVC reactor | 73 |
| #1 Capacitor reactor | 72 |

| Equipment | L _w dBA L _{eq} (15 minute) |
|----------------------|--|
| #2 Capacitor reactor | 73 |
| #3 Capacitor reactor | 73 |
| #6 Capacitor reactor | 83 |
| #7 Capacitor reactor | 83 |
| BESS transformer | 78 |
| BESS ¹ | 97 |

1) Calculated in general accordance with ISO 8297-1994

4.4 Model validation

The noise model used for the assessment was subjected to a validation process to ensure the accuracy of its noise predictions. The model validation process allows for the identification of any errors in the modelling setup and to demonstrate that the noise model accurately represents the existing, real-world conditions.

The validation process involves setting up a noise model using the determined sound power levels of existing, audible noise-generating plant within the substation and comparing the results with those measured around the site. If the results from the model are within +/- 2 dB then it is assumed that the model is accurate to real world operation of the site and can be used for predicting noise levels from future scenarios. The validation measurement locations were selected to ensure the substation is the dominant noise source, and that the model is accurately predicting noise transmission in the direction of the nearest noise sensitive receivers.

Table 4.3 outlines the validation process and results for the Project.

Table 4.3 Results of noise model validation

| Location ID | L _{eq} (period) dBA | | |
|-------------|------------------------------|---|------------|
| | Modelled noise level | Measured noise level L _{Min} dBA | Difference |
| NM88 | 51 | 52 | 1 |
| NM96 | 54 | 56 | 2 |
| NM103 | 61 | 61 | 0 |
| NM107 | 56 | 57 | -1 |
| NM117 | 52 | 51 | -1 |
| NM138 | 49 | 47 | -2 |
| NM143 | 55 | 53 | -2 |

The validation results indicate that the noise model is representative of actual operational noise levels, as the modelled noise levels are within +/- 2dB at the assessed locations. This represents the general threshold of modelling accuracy and is accepted by regulatory authorities as an indication of model validation

4.5 Predicted operational noise levels

This section presents the potential noise impacts under the proposed future substation configuration. Potential operational noise impacts were considered in accordance with the methodology outlined in Section 4.2. The results of this assessment are presented below in Table 4.4.

Operation of some equipment at the Project is expected to fluctuate due to load in the electricity network. However, for conservative assessment purposes, all equipment is assumed to operate concurrently at any time and will be assessed against the night-time IPNTLs.

Transgrid provided a potential sound power level of 102 dBA for the proposed new transformer. The activation of substation circuit breakers can result in short term impulsive noise events in the order of 115 dBA L_{Fmax} . This noise level is based on the results of attended noise monitoring at a number of large NSW substations. All other equipment has been modelled using the sound power levels determined from the onsite measurements. Locations of the circuit breaker have been provided by Transgrid and are presented in Appendix C.

Table 4.4 Predicted operational noise levels

| Receiver ID | Project noise trigger levels L _{eq,15 min} dBA | | | Sleep awakening criteria L _{FMax} dBA | Predicted operational noise levels L _{eq,15 min} dBA ¹ | | | | Predicted sleep awakening noise levels L _{Fmax} dBA | |
|-------------|--|---------|-------|---|--|----------|-----------------------------------|----------|--|-----------------------------------|
| | Day | Evening | Night | | Neutral meteorological conditions | | Adverse meteorological conditions | | Neutral meteorological conditions | Adverse meteorological conditions |
| | | | | | Existing | Proposed | Existing | Proposed | | |
| R01 | 48 | 37 | 37 | 52 | 20 | 20 | 20 | 26 | 30 | 38 |
| R02 | 48 | 37 | 37 | 52 | 21 | 21 | 21 | 27 | 31 | 38 |
| R03 | 65 ³ | | | N/A | 25 | 25 | 25 | 31 | N/A | N/A |
| R04 | 65 ³ | | | N/A | 25 | 26 | 25 | 31 | N/A | N/A |
| R05 | 65 ³ | | | N/A | 28 | 28 | 28 | 34 | N/A | N/A |
| R06 | 47 | 39 | 38 | 54 | 22 | 22 | 22 | 29 | 35 | 41 |
| R07 | 47 | 39 | 38 | 54 | 21 | 21 | 21 | 27 | 33 | 40 |
| R08 | 47 | 39 | 38 | 54 | 20 | 20 | 20 | 26 | 32 | 39 |
| R09 | 65 ³ | | | N/A | 40 | 41 | 40 | 45 | N/A | N/A |
| R10 | 60 ³ | | | N/A | 37 | 38 | 37 | 42 | N/A | N/A |
| R11 | 60 ³ | | | N/A | 40 | 40 | 40 | 44 | N/A | N/A |
| R12 | 65 ³ | | | N/A | 43 | 44 | 43 | 47 | N/A | N/A |

- (1) Includes a 5 dB penalty for annoying characteristics
- (2) The cells with **red text** show exceedances for operational for night criteria and sleep awakening for sleep awakening criteria.
- (3) When in use

4.6 Discussion

The result of the modelling demonstrates compliance with the project noise trigger levels for all representative noise sensitive receivers surrounding the Project, with the substation's current configuration. Furthermore, compliance is predicted at all modelled receivers for the future substation configuration, which includes a new transformer and the relocation of the #7 capacitor bank.

Receiver R06 is predicted to experience a likely maximum project noise level of 29 dBA during night-time, under noise-enhancing meteorological conditions, which is 9 dBA less than the established criterion for its respective NCA. Detailed noise contribution analysis reveals that the BESS contributed the most noise to all receivers. However, it was observed on site that the cooling fans of each battery unit change speed frequently (including turning off altogether), so the modelled assumption that all cooling fans run continuously is a conservative assumption.

Predicted noise levels from short term maximum noise events such as circuit breaker activation are predicted to meet the sleep awakening screening criteria level at all residential receivers. The worst affected receiver, R06, could expect external noise levels of up to 41 dBA, which is 13 dBA less than the respective criterion. It is noted that this is an infrequent event which is triggered to protect infrastructure from damage caused by short circuits or dangerous current fluctuations.

All results, with the exception of circuit breaker activation, include a 5 dB penalty for tonality, as outlined in Section 3.1.4.

Transgrid have indicated that the new transformer is expected to have a L_w of 102 dBA, which is expected to have negligible impact on overall noise levels emitted by the Project, as detailed in Table 4.4. As the Project is predicted to be compliant with the proposed future configuration, no additional noise mitigation and management measures are required.

5 Conclusions

WSP Australia Pty Ltd (WSP) has been engaged by Transgrid to examine the operational noise and sleep awakening impacts generated by the Sydney West 330 kV Substation in its current state and with the addition of a new 375 MVA 330/132 kV transformer and the relocation of the existing #7 330 kV capacitor bank. The results from the noise modelling are detailed in Section 4.

The future proposed configuration of the Sydney West 330 kV Substation was found to meet the relevant criteria outlined in the NPfI, and therefore no additional noise mitigation or management measures are required.

6 Limitations

This Report is provided by WSP Australia Pty Limited (WSP) for Transgrid (Client) in response to specific instructions from the Client and in accordance with WSP's proposal dated 4/10/2024 and agreement with the Client dated 15/10/2024 (Agreement).

6.1 Permitted purpose

This Report is provided by WSP for the purpose described in the Agreement and no responsibility is accepted by WSP for the use of the Report in whole or in part, for any other purpose (Permitted Purpose).

6.2 Qualifications and assumptions

The services undertaken by WSP in preparing this Report were limited to those specifically detailed in the Report and are subject to the scope, qualifications, assumptions and limitations set out in the Report or otherwise communicated to the Client.

Except as otherwise stated in the Report and to the extent that statements, opinions, facts, conclusion and / or recommendations in the Report (Conclusions) are based in whole or in part on information provided by the Client and other parties identified in the report (Information), those Conclusions are based on assumptions by WSP of the reliability, adequacy, accuracy and completeness of the Information and have not been verified. WSP accepts no responsibility for the Information.

WSP has prepared the Report without regard to any special interest of any person other than the Client when undertaking the services described in the Agreement or in preparing the Report.

6.3 Use and reliance

This Report should be read in its entirety and must not be copied, distributed or referred to in part only. The Report must not be reproduced without the written approval of WSP. WSP will not be responsible for interpretations or conclusions drawn by the reader. This Report (or sections of the Report) should not be used as part of a specification for a project or for incorporation into any other document without the prior agreement of WSP.

WSP is not (and will not be) obliged to provide an update of this Report to include any event, circumstance, revised Information or any matter coming to WSP's attention after the date of this Report. Data reported and Conclusions drawn are based solely on information made available to WSP at the time of preparing the Report. The passage of time; unexpected variations in ground conditions; manifestations of latent conditions; or the impact of future events (including (without limitation) changes in policy, legislation, guidelines, scientific knowledge; and changes in interpretation of policy by statutory authorities); may require further investigation or subsequent re-evaluation of the Conclusions.

This Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose. The Report does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise. It is the responsibility of the Client to accept (if the Client so chooses) any Conclusions contained within the Report and implement them in an appropriate, suitable and timely manner.

In the absence of express written consent of WSP, no responsibility is accepted by WSP for the use of the Report in whole or in part by any party other than the Client for any purpose whatsoever. Without the express written consent of WSP, any use which a third party makes of this Report or any reliance on (or decisions to be made) based on this Report is at the sole risk of those third parties without recourse to WSP. Third parties should make their own enquiries and obtain independent advice in relation to any matter dealt with or Conclusions expressed in the Report.

6.4 Disclaimer

No warranty, undertaking or guarantee whether expressed or implied, is made with respect to the data reported or the Conclusions drawn. To the fullest extent permitted at law, WSP, its related bodies corporate and its officers, employees and agents assumes no responsibility and will not be liable to any third party for, or in relation to any losses, damages or expenses (including any indirect, consequential or punitive losses or damages or any amounts for loss of profit, loss of revenue, loss of opportunity to earn profit, loss of production, loss of contract, increased operational costs, loss of business opportunity, site deprecation costs, business interruption or economic loss) of any kind whatsoever, suffered on incurred by a third party.

Appendix A

Detailed substation noise monitoring results



1/3 octave measurement results, L90 dBZ

| Location ID | 1/3 octave band frequency (Hz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|--------------------------------|----|------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-------|------|----|------|-------|----|----|------|----|-----|-------|
| | 20 | 25 | 31.5 | 40 | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25k | 1.6k | 2k | 2.5k | 3.15k | 4k | 5k | 6.3k | 8k | 10k | 12.5k |
| NM01 | 50 | 52 | 53 | 50 | 67 | 54 | 60 | 84 | 60 | 51 | 71 | 58 | 72 | 71 | 51 | 47 | 44 | 41 | 42 | 35 | 33 | 31 | 29 | 27 | 26 | 25 | 23 | 23 | 23 |
| NM02 | 47 | 47 | 52 | 53 | 62 | 53 | 52 | 72 | 49 | 48 | 48 | 51 | 66 | 60 | 48 | 43 | 45 | 42 | 43 | 35 | 33 | 31 | 30 | 28 | 26 | 25 | 25 | 25 | 25 |
| NM03 | 45 | 49 | 52 | 56 | 73 | 52 | 55 | 79 | 55 | 49 | 57 | 52 | 55 | 57 | 42 | 39 | 40 | 37 | 31 | 30 | 29 | 28 | 27 | 27 | 28 | 27 | 29 | 29 | 29 |
| NM04 | 47 | 50 | 52 | 52 | 67 | 50 | 52 | 72 | 49 | 46 | 54 | 49 | 62 | 54 | 48 | 46 | 49 | 44 | 41 | 34 | 31 | 29 | 27 | 25 | 25 | 25 | 24 | 24 | 23 |
| NM05 | 47 | 49 | 50 | 55 | 76 | 54 | 48 | 68 | 46 | 42 | 63 | 48 | 63 | 40 | 55 | 42 | 43 | 41 | 36 | 33 | 33 | 31 | 29 | 29 | 29 | 29 | 30 | 30 | 30 |
| NM06 | 49 | 50 | 48 | 51 | 71 | 51 | 60 | 84 | 60 | 52 | 65 | 60 | 75 | 66 | 55 | 57 | 52 | 46 | 38 | 33 | 33 | 31 | 29 | 28 | 27 | 28 | 28 | 28 | 28 |
| NM07 | 54 | 53 | 51 | 56 | 79 | 57 | 51 | 69 | 48 | 47 | 63 | 51 | 58 | 58 | 52 | 44 | 46 | 43 | 39 | 37 | 41 | 35 | 36 | 36 | 32 | 31 | 28 | 27 | 26 |
| NM08 | 51 | 52 | 55 | 53 | 56 | 49 | 50 | 68 | 49 | 42 | 61 | 43 | 45 | 40 | 41 | 41 | 43 | 40 | 41 | 33 | 31 | 29 | 28 | 27 | 26 | 27 | 26 | 26 | 23 |
| NM09 | 53 | 53 | 54 | 56 | 55 | 53 | 49 | 67 | 48 | 42 | 56 | 42 | 52 | 38 | 38 | 39 | 40 | 39 | 37 | 33 | 31 | 29 | 27 | 27 | 27 | 26 | 25 | 24 | 24 |
| NM10 | 49 | 51 | 51 | 51 | 51 | 51 | 51 | 64 | 45 | 41 | 49 | 40 | 49 | 37 | 40 | 40 | 38 | 38 | 35 | 32 | 30 | 28 | 26 | 26 | 26 | 26 | 26 | 25 | 23 |
| NM11 | 52 | 51 | 49 | 53 | 53 | 52 | 47 | 62 | 43 | 45 | 46 | 50 | 65 | 53 | 47 | 45 | 41 | 38 | 36 | 33 | 31 | 27 | 25 | 21 | 19 | 17 | 16 | 14 | 13 |
| NM12 | 47 | 47 | 51 | 49 | 51 | 48 | 45 | 55 | 41 | 44 | 57 | 47 | 62 | 53 | 37 | 43 | 39 | 37 | 36 | 30 | 28 | 25 | 23 | 21 | 20 | 19 | 18 | 17 | 14 |
| NM13 | 46 | 46 | 52 | 51 | 52 | 51 | 46 | 56 | 41 | 43 | 53 | 41 | 50 | 46 | 46 | 38 | 38 | 37 | 35 | 32 | 29 | 27 | 24 | 23 | 23 | 23 | 22 | 21 | 18 |
| NM14 | 47 | 47 | 52 | 50 | 50 | 48 | 46 | 46 | 40 | 45 | 57 | 41 | 53 | 47 | 40 | 39 | 44 | 40 | 38 | 36 | 36 | 33 | 31 | 28 | 26 | 25 | 24 | 23 | 22 |
| NM15 | 51 | 51 | 48 | 51 | 54 | 48 | 47 | 62 | 42 | 44 | 66 | 47 | 58 | 54 | 46 | 45 | 47 | 47 | 45 | 44 | 47 | 41 | 46 | 41 | 38 | 35 | 30 | 30 | 28 |
| NM16 | 49 | 49 | 51 | 50 | 53 | 52 | 48 | 58 | 49 | 44 | 57 | 44 | 56 | 50 | 41 | 41 | 41 | 40 | 37 | 34 | 33 | 30 | 28 | 26 | 25 | 24 | 23 | 22 | 20 |
| NM17 | 52 | 48 | 49 | 51 | 52 | 47 | 48 | 70 | 48 | 42 | 56 | 41 | 42 | 46 | 44 | 44 | 42 | 37 | 39 | 31 | 29 | 26 | 23 | 22 | 23 | 24 | 23 | 23 | 19 |
| NM18 | 50 | 51 | 50 | 49 | 53 | 52 | 51 | 64 | 45 | 45 | 54 | 39 | 44 | 39 | 37 | 41 | 41 | 39 | 36 | 33 | 32 | 30 | 27 | 24 | 23 | 23 | 23 | 23 | 20 |
| NM19 | 49 | 49 | 50 | 51 | 61 | 53 | 56 | 79 | 56 | 56 | 73 | 57 | 72 | 67 | 49 | 48 | 44 | 41 | 40 | 36 | 34 | 31 | 28 | 24 | 21 | 18 | 17 | 15 | 14 |
| NM20 | 47 | 49 | 54 | 54 | 59 | 53 | 50 | 59 | 46 | 52 | 73 | 57 | 71 | 63 | 58 | 45 | 44 | 41 | 38 | 35 | 33 | 31 | 27 | 24 | 20 | 18 | 17 | 16 | 14 |
| NM21 | 46 | 50 | 50 | 52 | 57 | 49 | 56 | 79 | 55 | 45 | 64 | 46 | 59 | 54 | 44 | 42 | 41 | 40 | 36 | 33 | 30 | 28 | 26 | 24 | 23 | 23 | 23 | 22 | 21 |
| NM22 | 50 | 48 | 51 | 52 | 59 | 51 | 54 | 76 | 53 | 55 | 73 | 56 | 70 | 58 | 46 | 44 | 45 | 43 | 39 | 34 | 32 | 30 | 27 | 26 | 25 | 24 | 23 | 23 | 23 |
| NM23 | 50 | 49 | 48 | 51 | 49 | 51 | 58 | 82 | 58 | 58 | 76 | 59 | 72 | 63 | 48 | 49 | 48 | 45 | 43 | 34 | 33 | 30 | 29 | 27 | 26 | 27 | 26 | 26 | 26 |
| NM24 | 49 | 52 | 52 | 50 | 62 | 52 | 59 | 82 | 58 | 53 | 41 | 57 | 72 | 60 | 54 | 46 | 45 | 45 | 42 | 40 | 38 | 34 | 33 | 28 | 25 | 23 | 22 | 20 | 18 |
| NM25 | 53 | 53 | 51 | 54 | 62 | 56 | 53 | 73 | 50 | 46 | 67 | 50 | 63 | 63 | 48 | 48 | 45 | 48 | 44 | 36 | 34 | 30 | 26 | 23 | 21 | 20 | 20 | 19 | 20 |
| NM26 | 49 | 50 | 52 | 54 | 62 | 54 | 50 | 67 | 47 | 46 | 65 | 49 | 63 | 61 | 45 | 42 | 42 | 47 | 43 | 35 | 33 | 30 | 26 | 24 | 22 | 22 | 23 | 24 | 24 |
| NM27 | 48 | 50 | 50 | 51 | 57 | 54 | 54 | 70 | 50 | 44 | 60 | 48 | 61 | 58 | 43 | 42 | 42 | 41 | 38 | 35 | 32 | 29 | 27 | 24 | 23 | 23 | 22 | 22 | 21 |
| NM28 | 55 | 54 | 52 | 52 | 61 | 53 | 53 | 76 | 53 | 48 | 69 | 61 | 76 | 62 | 43 | 51 | 47 | 41 | 38 | 33 | 32 | 29 | 26 | 24 | 23 | 23 | 24 | 24 | 25 |
| NM29 | 48 | 48 | 51 | 53 | 63 | 55 | 52 | 74 | 51 | 43 | 65 | 55 | 70 | 53 | 42 | 41 | 41 | 39 | 36 | 33 | 31 | 29 | 26 | 25 | 23 | 23 | 23 | 23 | 23 |
| NM30 | 47 | 51 | 52 | 52 | 64 | 53 | 55 | 79 | 55 | 47 | 57 | 42 | 50 | 55 | 46 | 44 | 43 | 41 | 38 | 35 | 32 | 29 | 26 | 24 | 22 | 21 | 21 | 21 | 21 |
| NM31 | 54 | 52 | 52 | 51 | 53 | 54 | 57 | 76 | 53 | 48 | 67 | 59 | 74 | 74 | 68 | 57 | 57 | 58 | 50 | 48 | 42 | 37 | 35 | 30 | 29 | 28 | 27 | 24 | 23 |
| NM32 | 51 | 53 | 54 | 54 | 56 | 54 | 52 | 69 | 47 | 43 | 58 | 55 | 70 | 72 | 60 | 53 | 50 | 49 | 46 | 42 | 38 | 33 | 31 | 30 | 27 | 27 | 26 | 25 | 25 |
| NM33 | 52 | 52 | 52 | 50 | 53 | 55 | 50 | 68 | 47 | 43 | 63 | 50 | 55 | 51 | 53 | 60 | 51 | 53 | 45 | 41 | 36 | 31 | 29 | 26 | 24 | 25 | 25 | 25 | 24 |
| NM34 | 49 | 50 | 50 | 51 | 50 | 49 | 48 | 62 | 42 | 42 | 58 | 53 | 68 | 74 | 58 | 63 | 59 | 46 | 45 | 44 | 38 | 33 | 30 | 28 | 27 | 26 | 25 | 25 | 23 |
| NM35 | 54 | 53 | 55 | 54 | 53 | 55 | 49 | 57 | 44 | 47 | 63 | 56 | 71 | 62 | 71 | 62 | 52 | 58 | 57 | 51 | 42 | 37 | 34 | 29 | 27 | 27 | 26 | 25 | 23 |
| NM36 | 55 | 55 | 52 | 55 | 55 | 55 | 52 | 68 | 49 | 48 | 66 | 56 | 72 | 72 | 63 | 64 | 59 | 59 | 54 | 51 | 40 | 39 | 39 | 36 | 34 | 34 | 33 | 31 | 31 |
| NM37 | 42 | 48 | 49 | 47 | 49 | 44 | 41 | 62 | 48 | 62 | 72 | 69 | 79 | 74 | 69 | 58 | 55 | 52 | 48 | 46 | 42 | 38 | 36 | 32 | 28 | 24 | 21 | 20 | 18 |
| NM38 | 45 | 48 | 46 | 47 | 58 | 49 | 64 | 88 | 64 | 60 | 59 | 68 | 85 | 78 | 62 | 58 | 54 | 51 | 50 | 48 | 45 | 41 | 36 | 31 | 27 | 23 | 19 | 17 | 14 |
| NM39 | 46 | 48 | 48 | 43 | 49 | 50 | 56 | 80 | 57 | 64 | 73 | 62 | 75 | 73 | 71 | 61 | 56 | 47 | 45 | 43 | 38 | 35 | 31 | 28 | 24 | 22 | 21 | 20 | 20 |
| NM40 | 49 | 47 | 47 | 44 | 61 | 46 | 55 | 79 | 57 | 68 | 70 | 66 | 84 | 80 | 68 | 59 | 55 | 54 | 52 | 49 | 47 | 42 | 40 | 37 | 33 | 30 | 25 | 22 | 17 |
| NM41 | 48 | 49 | 50 | 51 | 51 | 53 | 51 | 65 | 45 | 41 | 49 | 40 | 42 | 38 | 37 | 38 | 38 | 36 | 33 | 32 | 30 | 27 | 26 | 25 | 27 | 24 | 24 | 25 | 25 |
| NM42 | 50 | 55 | 53 | 57 | 55 | 55 | 53 | 64 | 46 | 43 | 52 | 40 | 44 | 38 | 40 | 40 | 40 | 39 | 37 | 35 | 33 | 31 | 30 | 28 | 27 | 26 | 26 | 24 | 24 |
| NM43 | 54 | 56 | 56 | 57 | 56 | 57 | 57 | 69 | 48 | 45 | 45 | 42 | 52 | 41 | 43 | 42 | 41 | 42 | 39 | 35 | 33 | 30 | 28 | 26 | 25 | 23 | 23 | 20 | 17 |
| NM44 | 52 | 57 | 55 | 57 | 56 | 54 | 52 | 63 | 45 | 43 | 49 | 41 | 50 | 41 | 41 | 42 | 42 | 39 | 38 | 35 | 33 | 29 | 27 | 24 | 22 | 21 | 21 | 17 | 14 |
| NM45 | 51 | 52 | 53 | 52 | 53 | 53 | 51 | 64 | 46 | 41 | 48 | 49 | 64 | 50 | 48 | 56 | 56 | 48 | 48 | 48 | 46 | 41 | 41 | 40 | 39 | 38 | 36 | 33 | 33 |
| NM46 | 53 | 50 | 54 | 53 | 65 | 57 | 51 | 58 | 47 | 44 | 49 | 46 | 53 | 53 | 48 | 54 | 57 | 54 | 52 | 52 | 48 | 47 | 46 | 45 | 44 | 42 | 41 | 39 | 39 |
| NM47 | 50 | 50 | 54 | 50 | 56 | 53 | 46 | 57 | 43 | 42 | 49 | 42 | 52 | 51 | 45 | 57 | 55 | 50 | 49 | 48 | 45 | 42 | 41 | 39 | 39 | 38 | 37 | 34 | 33 |
| NM48 | 48 | 48 | 53 | 50 | 68 | 50 | 47 | 65 | 45 | 41 | 46 | 51 | 64 | 50 | 46 | 59 | 54 | 51 | 48 | 50 | 48 | 43 | 43 | 40 | 39 | 38 | 37 | 35 | 34 |
| NM49 | 48 | 49 | 52 | 50 | 49 | 49 | 48 | 68 | 46 | 40 | 42 | 41 | 46 | 53 | 42 | 53 | 50 | 49 | 51 | 48 | 43 | 43 | 40 | 37 | 36 | 35 | 32 | 32 | 32 |
| NM50 | 49 | 51 | 52 | 49 | 52 | 50 | 46 | 46 | 40 | 37 | 40 | 40 | 51 | 47 | 42 | 50 | 47 | 45 | 43 | 43 | 39 | 37 | 35 | 34 | 33 | 33 | 33 | 31 | 31 |
| NM51 | 50 | 51 | 52 | 53 | 52 | 51 | 47 | 50 | 44 | 41 | 43 | 43 | 58 | 54 | 50 | 52 | 51 | 48 | 48 | 46 | 42 | 40 | 39 | 38 | 37 | 36 | 36 | 34 | 34 |
| NM52 | 49 | 49 | 49 | 49 | 50 | 50 | 50 | 72 | 48 | 38 | 41 | 40 | 52 | 45 | 43 | 50 | 48 | 45 | 44 | 43 | 39 | 35 | 36 | 35 | 34 | 34 | 32 | 32 | 31 |
| NM53 | 47 | 48 | 51 | 49 | 50 | 49 | 48 | 69 | 46 | 37 | 35 | 48 | 63 | 52 | 46 | 62 | 51 | 50 | 46 | 48 | 45 | 40 | 40 | 38 | 38 | 37 | 35 | 33 | 32 |
| NM54 | 51 | 49 | 54 | 51 | 70 | 52 | 51 | 62 | 44 | 42 | 39 | 49 | 58 | 50 | 46 | 57 | 52 | 52 | 52 | 51 | 48 | 47 | 47 | 43 | 43 | 41 | 39 | 38 | 37 |
| NM55 | 51 | 60 | 54 | 53 | 54 | 55 | 52 | 64 | 55 | 41 | 41 | 43 | 44 | 43 | 52 | 45 | 43 | 42 | 38 | 35 | 33 | 30 | 26 | 23 | 21 | 19 | 18 | 16 | 15 |
| NM56 | 51 | 59 | 55 | 54 | 66 | 55 | 50 | 63 | 47 | 46 | 48 | 43 | 4 | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| NM72 | 47 | 59 | 53 | 50 | 61 | 52 | 49 | 55 | 46 | 45 | 48 | 45 | 44 | 47 | 41 | 46 | 41 | 41 | 39 | 36 | 33 | 30 | 28 | 26 | 23 | 22 | 21 | 21 | 20 | |
| NM73 | 49 | 52 | 53 | 57 | 55 | 56 | 54 | 54 | 54 | 51 | 59 | 64 | 51 | 48 | 49 | 49 | 50 | 47 | 45 | 44 | 44 | 42 | 40 | 40 | 37 | 33 | 31 | 27 | 23 | |
| NM74 | 52 | 56 | 60 | 57 | 55 | 59 | 56 | 54 | 55 | 51 | 56 | 59 | 50 | 50 | 50 | 49 | 50 | 47 | 45 | 44 | 43 | 41 | 39 | 40 | 37 | 34 | 31 | 28 | 23 | |
| NM75 | 54 | 57 | 55 | 56 | 57 | 54 | 54 | 53 | 53 | 52 | 57 | 62 | 55 | 54 | 52 | 52 | 54 | 50 | 47 | 47 | 45 | 44 | 42 | 43 | 40 | 38 | 36 | 33 | 28 | |
| NM76 | 51 | 54 | 53 | 56 | 56 | 56 | 54 | 54 | 54 | 54 | 59 | 62 | 56 | 54 | 52 | 53 | 54 | 53 | 51 | 51 | 48 | 46 | 44 | 44 | 43 | 40 | 37 | 34 | 29 | |
| NM77 | 53 | 58 | 57 | 59 | 60 | 58 | 60 | 57 | 56 | 56 | 61 | 59 | 52 | 54 | 53 | 53 | 50 | 49 | 47 | 46 | 45 | 42 | 41 | 40 | 38 | 37 | 36 | 33 | 26 | |
| NM78 | 51 | 56 | 56 | 55 | 55 | 57 | 54 | 53 | 53 | 53 | 59 | 59 | 50 | 51 | 53 | 52 | 49 | 48 | 45 | 45 | 43 | 41 | 40 | 40 | 37 | 35 | 33 | 30 | 25 | |
| NM79 | 55 | 57 | 54 | 56 | 58 | 57 | 51 | 52 | 50 | 48 | 55 | 52 | 51 | 51 | 47 | 46 | 47 | 46 | 43 | 43 | 42 | 39 | 39 | 39 | 37 | 35 | 33 | 30 | 24 | |
| NM80 | 53 | 55 | 55 | 53 | 57 | 54 | 51 | 52 | 48 | 45 | 47 | 46 | 47 | 44 | 43 | 45 | 46 | 45 | 43 | 41 | 39 | 35 | 31 | 28 | 28 | 32 | 33 | 28 | 19 | |
| NM81 | 53 | 56 | 54 | 54 | 56 | 57 | 54 | 60 | 52 | 50 | 51 | 53 | 48 | 43 | 44 | 45 | 44 | 43 | 41 | 39 | 36 | 34 | 30 | 28 | 27 | 28 | 29 | 27 | 20 | |
| NM82 | 54 | 57 | 57 | 53 | 56 | 55 | 54 | 69 | 52 | 47 | 52 | 50 | 50 | 48 | 45 | 44 | 46 | 46 | 43 | 41 | 37 | 35 | 31 | 29 | 27 | 27 | 26 | 23 | 16 | |
| NM83 | 52 | 57 | 58 | 54 | 55 | 55 | 50 | 48 | 51 | 46 | 50 | 51 | 48 | 44 | 42 | 43 | 44 | 43 | 41 | 39 | 36 | 34 | 31 | 29 | 27 | 28 | 29 | 26 | 20 | |
| NM84 | 52 | 55 | 55 | 57 | 60 | 55 | 49 | 59 | 52 | 47 | 47 | 51 | 51 | 48 | 44 | 43 | 44 | 44 | 41 | 40 | 38 | 35 | 32 | 30 | 28 | 28 | 27 | 24 | 17 | |
| NM85 | 53 | 56 | 57 | 57 | 60 | 55 | 51 | 57 | 54 | 48 | 57 | 51 | 49 | 47 | 44 | 44 | 45 | 45 | 41 | 40 | 38 | 34 | 32 | 30 | 28 | 26 | 25 | 22 | 18 | |
| NM86 | 48 | 48 | 50 | 48 | 44 | 43 | 43 | 42 | 40 | 40 | 39 | 36 | 35 | 35 | 36 | 39 | 41 | 41 | 38 | 35 | 32 | 29 | 27 | 26 | 25 | 26 | 25 | 23 | 18 | |
| NM87 | 47 | 47 | 46 | 45 | 46 | 46 | 45 | 43 | 42 | 41 | 38 | 38 | 38 | 36 | 35 | 35 | 34 | 33 | 32 | 30 | 30 | 31 | 33 | 35 | 35 | 34 | 32 | 28 | 21 | |
| NM88 | 50 | 51 | 53 | 53 | 56 | 52 | 51 | 63 | 46 | 43 | 56 | 43 | 53 | 41 | 42 | 43 | 42 | 39 | 36 | 33 | 31 | 31 | 29 | 32 | 36 | 32 | 22 | 21 | 19 | |
| NM89 | 45 | 46 | 44 | 44 | 47 | 45 | 45 | 64 | 45 | 45 | 43 | 41 | 50 | 43 | 45 | 42 | 38 | 36 | 34 | 31 | 30 | 28 | 27 | 33 | 33 | 32 | 32 | 29 | | |
| NM90 | 45 | 45 | 44 | 45 | 59 | 44 | 46 | 67 | 46 | 43 | 59 | 47 | 62 | 52 | 39 | 39 | 36 | 35 | 32 | 29 | 29 | 28 | 30 | 33 | 32 | 34 | 29 | 30 | 28 | |
| NM91 | 46 | 46 | 46 | 46 | 60 | 46 | 46 | 67 | 46 | 42 | 58 | 42 | 52 | 43 | 37 | 37 | 37 | 35 | 32 | 30 | 29 | 29 | 28 | 30 | 31 | 31 | 28 | 27 | 26 | |
| NM92 | 46 | 46 | 46 | 45 | 54 | 47 | 44 | 62 | 45 | 42 | 45 | 39 | 48 | 43 | 37 | 38 | 37 | 37 | 34 | 30 | 29 | 27 | 26 | 30 | 30 | 27 | 22 | 20 | 18 | |
| NM93 | 45 | 46 | 45 | 44 | 48 | 46 | 43 | 55 | 44 | 43 | 50 | 40 | 42 | 39 | 40 | 41 | 39 | 37 | 34 | 32 | 29 | 27 | 25 | 27 | 31 | 27 | 21 | 19 | 17 | |
| NM94 | 46 | 47 | 48 | 48 | 51 | 49 | 49 | 66 | 46 | 44 | 46 | 41 | 42 | 38 | 39 | 42 | 42 | 40 | 37 | 34 | 32 | 28 | 26 | 27 | 32 | 27 | 21 | 19 | 16 | |
| NM95 | 43 | 45 | 44 | 43 | 54 | 48 | 45 | 66 | 46 | 41 | 51 | 41 | 43 | 39 | 41 | 42 | 40 | 38 | 36 | 33 | 31 | 27 | 25 | 28 | 29 | 26 | 20 | 18 | 15 | |
| NM96 | 46 | 45 | 44 | 46 | 52 | 48 | 44 | 61 | 44 | 45 | 63 | 48 | 62 | 48 | 39 | 38 | 38 | 37 | 34 | 31 | 29 | 27 | 25 | 28 | 31 | 27 | 21 | 19 | 17 | |
| NM97 | 45 | 45 | 46 | 46 | 55 | 48 | 47 | 67 | 46 | 41 | 56 | 39 | 47 | 41 | 39 | 40 | 38 | 37 | 35 | 32 | 30 | 27 | 27 | 30 | 30 | 32 | 22 | 20 | 18 | |
| NM98 | 41 | 42 | 42 | 42 | 55 | 45 | 43 | 61 | 44 | 40 | 47 | 40 | 48 | 41 | 39 | 39 | 38 | 35 | 34 | 32 | 29 | 27 | 31 | 31 | 30 | 23 | 22 | 20 | 20 | |
| NM99 | 41 | 42 | 42 | 42 | 53 | 48 | 44 | 63 | 44 | 39 | 57 | 42 | 54 | 50 | 44 | 40 | 38 | 36 | 34 | 32 | 29 | 28 | 28 | 30 | 29 | 26 | 22 | 21 | 20 | |
| NM100 | 45 | 45 | 47 | 46 | 51 | 48 | 47 | 68 | 47 | 42 | 48 | 43 | 52 | 52 | 50 | 53 | 44 | 43 | 41 | 37 | 34 | 32 | 34 | 33 | 31 | 30 | 25 | 23 | 20 | |
| NM101 | 50 | 48 | 47 | 46 | 50 | 49 | 44 | 62 | 47 | 42 | 57 | 43 | 47 | 50 | 52 | 53 | 47 | 45 | 40 | 38 | 34 | 33 | 32 | 34 | 30 | 27 | 24 | 24 | 21 | |
| NM102 | 46 | 48 | 49 | 49 | 51 | 48 | 49 | 66 | 48 | 45 | 54 | 43 | 46 | 49 | 47 | 56 | 43 | 42 | 40 | 36 | 32 | 30 | 30 | 32 | 30 | 30 | 25 | 24 | 23 | |
| NM103 | 44 | 45 | 45 | 46 | 52 | 49 | 48 | 65 | 47 | 44 | 57 | 47 | 60 | 56 | 61 | 53 | 47 | 45 | 42 | 38 | 35 | 31 | 31 | 30 | 30 | 29 | 27 | 25 | 25 | |
| NM104 | 48 | 46 | 46 | 51 | 52 | 48 | 48 | 62 | 47 | 45 | 50 | 40 | 44 | 50 | 48 | 54 | 49 | 41 | 38 | 36 | 32 | 29 | 28 | 29 | 30 | 27 | 24 | 23 | 21 | |
| NM105 | 47 | 48 | 47 | 48 | 58 | 52 | 46 | 49 | 46 | 41 | 49 | 40 | 50 | 43 | 46 | 45 | 44 | 43 | 40 | 37 | 34 | 31 | 30 | 30 | 29 | 29 | 26 | 26 | 24 | |
| NM106 | 48 | 48 | 50 | 50 | 52 | 50 | 50 | 72 | 49 | 44 | 52 | 42 | 44 | 44 | 40 | 40 | 41 | 39 | 37 | 34 | 31 | 29 | 28 | 29 | 29 | 29 | 27 | 26 | 24 | |
| NM107 | 50 | 49 | 50 | 49 | 56 | 48 | 46 | 60 | 43 | 47 | 58 | 42 | 52 | 54 | 43 | 38 | 40 | 36 | 33 | 31 | 29 | 28 | 27 | 29 | 30 | 28 | 27 | 27 | 25 | |
| NM108 | 44 | 46 | 46 | 43 | 51 | 45 | 44 | 59 | 43 | 41 | 51 | 40 | 53 | 36 | 38 | 37 | 37 | 36 | 32 | 29 | 27 | 26 | 26 | 28 | 29 | 27 | 26 | 24 | 21 | |
| NM109 | 46 | 46 | 47 | 44 | 53 | 44 | 44 | 56 | 44 | 41 | 39 | 37 | 41 | 41 | 41 | 39 | 37 | 34 | 30 | 27 | 26 | 28 | 31 | 28 | 26 | 26 | 25 | 23 | 23 | |
| NM110 | 47 | 47 | 44 | 44 | 62 | 44 | 46 | 67 | 44 | 40 | 47 | 47 | 62 | 46 | 44 | 43 | 38 | 36 | 32 | 30 | 28 | 27 | 27 | 29 | 37 | 38 | 28 | 27 | 26 | |
| NM111 | 42 | 45 | 42 | 46 | 68 | 49 | 48 | 51 | 41 | 41 | 56 | 38 | 43 | 40 | 36 | 37 | 37 | 34 | 32 | 30 | 29 | 27 | 26 | 28 | 32 | 32 | 26 | 25 | 23 | |
| NM112 | 52 | 51 | 51 | 55 | 57 | 51 | 48 | 65 | 46 | 40 | 47 | 44 | 50 | 46 | 44 | 48 | 46 | 44 | 42 | 38 | 34 | 31 | 31 | 29 | 33 | 27 | 20 | 22 | 19 | |
| NM113 | 49 | 48 | 47 | 51 | 53 | 48 | 46 | 66 | 45 | 41 | 45 | 43 | 51 | 41 | 42 | 45 | 45 | 45 | 42 | 39 | 35 | 32 | 32 | 29 | 43 | 35 | 22 | 23 | 20 | |
| NM114 | 54 | 50 | 50 | 54 | 53 | 53 | 50 | 66 | 45 | 41 | 46 | 42 | 51 | 41 | 43 | 46 | 46 | 45 | 42 | 41 | 36 | 32 | 33 | 28 | 38 | 33 | 23 | 26 | 24 | |
| NM115 | 46 | 47 | 46 | 46 | 58 | 47 | 47 | 68 | 46 | 40 | 41 | 44 | 50 | 40 | 43 | 44 | 44 | 44 | 40 | 40 | 35 | 31 | 31 | 29 | 38 | 37 | 27 | 29 | 27 | |
| NM116 | 47 | 46 | 46 | 48 | 57 | 48 | 53 | 74 | 50 | 42 | 49 | 44 | 46 | 40 | 45 | 47 | 46 | 43 | 41 | 41 | 37 | 32 | 32 | 29 | 38 | 33 | 23 | 25 | 23 | |
| NM117 | 43 | 43 | 44 | 45 | 50 | 46 | 44 | 57 | 43 | 42 | 51 | 44 | 54 | 44 | 42 | 42 | 41 | 40 | 38 | 36 | 32 | 29 | 31 | 30 | 29 | 26 | 22 | 23 | 21 | |
| NM118 | 45 | 48 | 49 | 47 | 50 | 50 | 50 | 54 | 52 | 50 | 61 | 67 | 53 | 52 | 54 | 53 | 52 | 49 | 49 | 48 | 45 | 44 | 44 | 45 | 42 | 38 | 36 | 33 | 28 | |
| NM119 | 42 | 44 | 46 | 45 | 49 | 50 | 47 | 49 | 50 | 49 | 61 | 67 | 55 | 52 | 55 | 53 | 50 | 49 | 48 | 47 | 46 | 44 | 43 | 44 | 41 | 37 | 34 | 31 | 26 | |
| NM120 | 41 | 45 | 53 | 46 | 51 | 50 | 47 | 49 | 52 | 49 | 59 | 64 | 55 | 54 | 53 | 53 | 50 | 49 | 48 | 47 | 45 | 44 | 43 | 44 | 41 | 38 | 36 | 33 | 28 | |
| NM121 | 44 | 45 | 48 | 52 | 51 | 50 | 48 | 51 | 52 | 49 | 60 | 63 | 53 | 51 | 53 | 51 | 50 | 48 | 47 | 47 | 44 | 43 | 42 | 43 | 41 | 37 | 34 | 31 | 27 | |
| NM122 | 46 | 49 | 52 | 51 | 52 | 55 | 53 | 54 | 53 | 50 | 60 | 65 | 53 | 52 | 54 | 50 | 49 | 47 | 46 | 46 | 44 | 42 | 42 | 42 | 39 | 35 | 33 | 29 | 24 | |
| NM123 | 47 | 56 | 53 | 50 | 55 | 60 | 55 | 48 | 52 | 48 | 53 | 58 | 50 | 50 | 51 | 50 | 48 | 46 | 45 | 44 | 41 | 39 | 37 | 38 | 35 | 31 | 28 | 23 | 18 | |
| NM124 | 48 | 50 | 49 | 48 | 50 | 48 | 45 | 47 | 47 | 45 | 49 | 55 | 51 | 49 | 49 | 48 | 46 | 44 | 43 | 45 | 42 | 40 | 41 | 42 | 40 | 37 | 35 | 33 | 28 | |
| NM125 | 46 | 47 | 47 | 46 | 49 | 49 | 47 | 46 | 49 | 48 | 56 | 61 | 49 | 45 | 45 | 51 | 50 | 48 | 46 | 45 | 43 | 40 | 41 | 41 | 39 | 36 | 34 | 31 | 26 | |
| NM126 | 45 | 48 | 49 | 48 | 48 | 51 | 46 | 48 | 47 | 45 | 53 | 57 | 46 | 45 | 46 | 46 | 46 | 48 | 48 | 44 | 41 | 38 | 37 | 38 | 35 | 31 | 28 | 24 | 19 | |
| NM127 | 46 | 46 | 48 | 48 | 52 | 53 | 48 | 48 | 49 | 48 | 51 | 54 | 46 | 45 | 48 | 48 | 46 | 45 | 44 | 44 | 42 | 40 | 38 | 37 | 37 | 34 | 30 | 27 | 23 | 18 |
| NM128 | 50 | 50 | 50 | 49 | 51 | 55 | 50 | 50 | 51 | 51 | 58 | 62 | 52 | 50 | 52 | 51 | 49 | 48 | 47 | 47 | 43 | 42 | 41 | 42 | 39 | 35 | 33 | 30 | 25 | |
| NM | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Appendix B

Site layout and on-site noise measurement locations



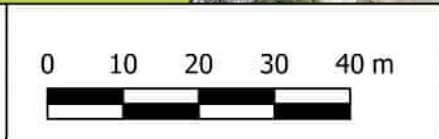


Map: Appendix B-1

Author: JF

Date: 19/11/2024

Approved by: NR



1:1,000 at A4

- Legend**
- Noise Sources
 - BESS
 - Transformers
 - Reactors
 - Monitoring Locations
 - Existing Buildings
 - Blast Walls
 - Site Boundary

Transgrid - Sydney West Substation
 Site layout and on-site measurements locations



www.wsp.com

To be read in conjunction with WSP document: PS219008-ACO-REP-SydneyWest
 Map Source: MetroMaps
 © WSP Australia Pty Ltd ("WSP") Copyright in the drawings, information and data recorded ("the information") is the property of WSP. This document and the information are solely for the use of the authorized recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by WSP. WSP makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information. NCSI Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF WSP Australia Pty Ltd

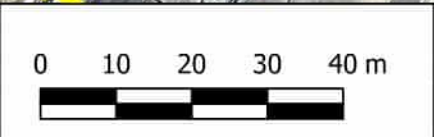


Map: Appendix B-2

Author: JF

Date: 19/11/2024

Approved by: NR



Legend

- Noise Sources
- BESS
- Transformers
- Reactors
- Monitoring Locations
- Existing Buildings
- Blast Walls
- Site Boundary

Transgrid - Sydney West Substation

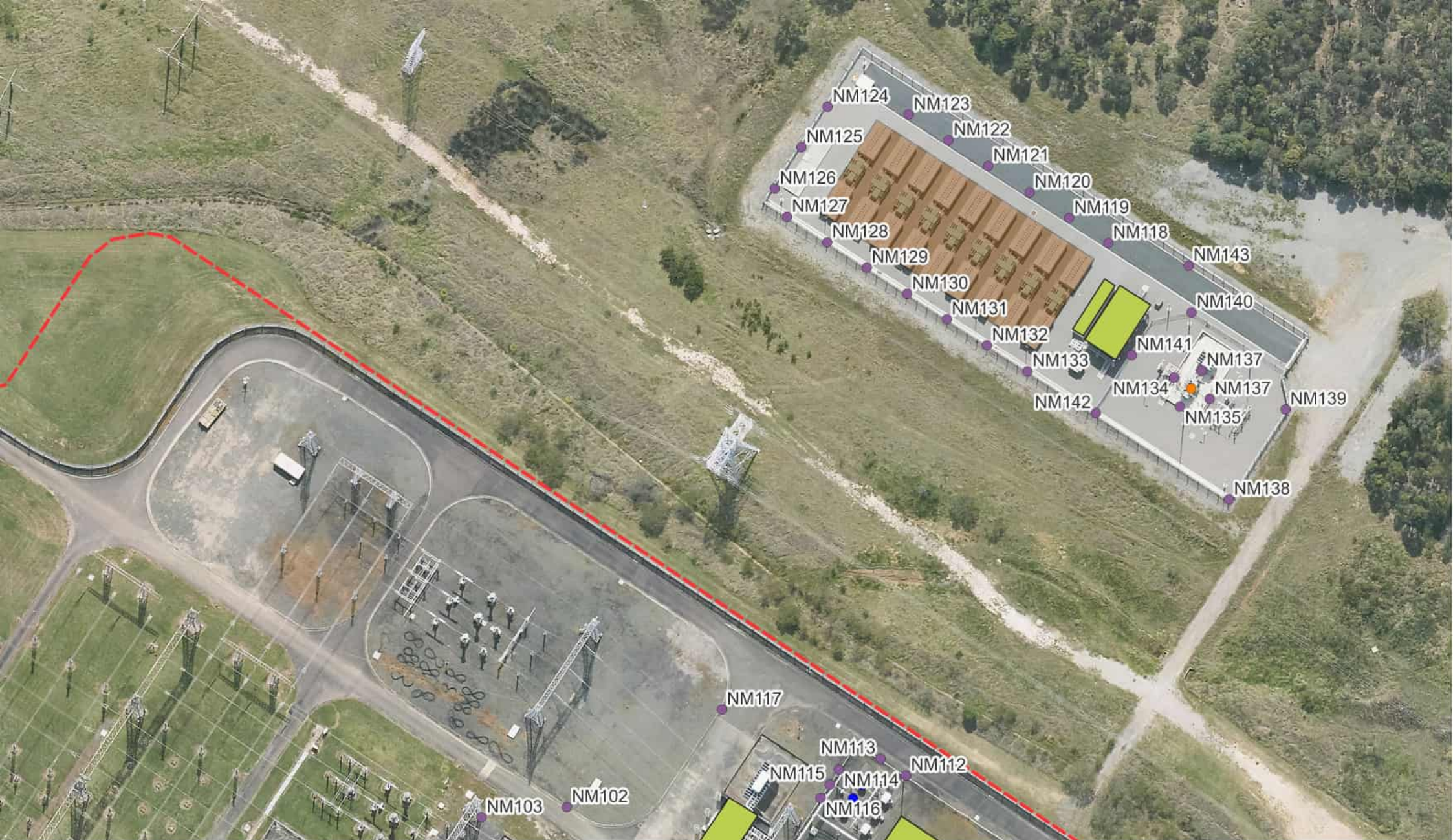
Site layout and on-site measurements locations



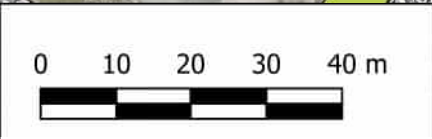
To be read in conjunction with WSP document: PS219008-ACO-REP-SydneyWest
Map Source: MetroMaps

1:1,000 at A4

© WSP Australia Pty Ltd ("WSP") Copyright in the drawings, information and data recorded ("the information") is the property of WSP. This document and the information are solely for the use of the authorized recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by WSP. WSP makes no representation, undertake no duty and accepts no responsibility to any third party who may use or rely upon this document or the information. NCSI Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF WSP Australia Pty Ltd



| | |
|-------------------|-----------------|
| Map: Appendix B-3 | Author: JF |
| Date: 19/11/2024 | Approved by: NR |



| Legend | |
|---------------|----------------------|
| Noise Sources | Monitoring Locations |
| BESS | Existing Buildings |
| Transformers | Blast Walls |
| Reactors | Site Boundary |

Transgrid - Sydney West Substation
 Site layout and on-site measurements locations



To be read in conjunction with WSP document: PS219008-ACO-REP-SydneyWest
 Map Source: MetroMaps

© WSP Australia Pty Ltd ("WSP") Copyright in the drawings, information and data recorded ("the information") is the property of WSP. This document and the information are solely for the use of the authorized recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by WSP. WSP makes no representation, undertake no duty and accepts no responsibility to any third party who may use or rely upon this document or the information. NCSI Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF WSP Australia Pty Ltd

Appendix C

Circuit breaker locations



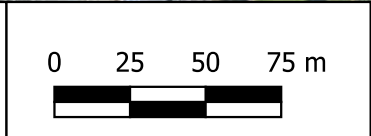


Map: Appendix C

Author: NR

Date: 27/11/2024

Approved by: BI



Legend

- Site Boundary
- Circuit breaker

Transgrid - Sydney West Substation
Circuit breaker locations

To be read in conjunction with WSP document: PS219008-ACO-REP-SydneyWest
Map Source: MetroMaps

© WSP Australia Pty Ltd ("WSP") Copyright in the drawings, information and data recorded ("the information") is the property of WSP. This document and the information are solely for the use of the authorized recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by WSP. WSP makes no representation, undertakes no duty and accepts no responsibility to any third party who may use or rely upon this document or the information. NCSI Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF WSP Australia Pty Ltd



www.wsp.com

