Review of Environmental Factors
Concord Zone 11kV Switchgear Replacement

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Disclaimer

The review of environmental factors is based on information provided to the author, including the scope of works as outlined in the proposal description. The review of environmental factors is provided strictly on the basis that information provided for its preparation can be relied on and is accurate, complete and adequate.

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Document history

REF revision history		
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0.1	25 May 20	New issue- Initial Draft for internal input, review and discussion
0.2	29 May 20	Project team reviewed.
0.3	15 Jun 20	Draft for public exhibition
0.4	31 Aug 21	Final Draft inclusive of submissions report, construction access, removal of on-site detention requirement and include works associated with Transformers one, two and three. Project team reviewed.
0.5	13 Sep 21	Manager- Environmental Services reviewed
1.0	20 Sep 21	Final approved version

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Glossary

Term	Meaning
A	amp: the unit of measure for current (or load) which is the amount of electricity flowing through the wires.
Aboriginal heritage	Any: • deposit, object, place or material evidence (including remains of Aboriginal people) relating to Aboriginal habitation; or • places having particular or special significance to Aboriginal people in accordance with Aboriginal culture and traditions, and which has been declared by the Minister to be protected under the NPW Act, EPBC Act, or *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.
ACM	Asbestos containing material
AHD	Australian Height Datum
ASS	Acid sulphate soils: are naturally occurring sediments and soils containing iron sulphides (principally pyrite) and/or their precursors or oxidation products. This includes Actual and Potential acid sulfate soils. Both can be found within the same soil profile.
Blue Book	*Managing Urban Stormwater - Soils and Construction* (Landcom, 2004)
BCA	*Building Code of Australia* (Australian Building Codes Board, 2016): is Volumes One and Two of the National Construction Code (NCC) which is an initiative of the Council of Australian Governments developed to incorporate all on-site construction requirements into a single code. The BCA is produced and maintained by the Australian Building Codes Board on behalf of the Australian Government and State and Territory Governments. The BCA has been given the status of building regulations by all States and Territories.
CEMP	construction environmental management plan
Classified road	The *Roads Act 1993* provides for roads to be classified as Freeways, Controlled Access Roads, Tollways, Highways, Main Roads, Secondary Roads, Tourist Roads, Transitways and State Works.
Climate Change	Describes both changed average climatic conditions, such as increased temperature and lower average rainfall, as well as changes in the patterns of extreme events, including increased frequency and intensity of storms.
CPESC	Certified Professional in Erosion and Sediment Control
cm	centimetre
CNVIA	Construction Noise and Vibration Impact Assessment
CNVMP	Construction Noise and Vibration Management Plan
CO_2	carbon dioxide
dB(A)	decibels (A) weighted
Determining authority	A Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.
DG	Ausgrid's distribution guideline
DM	demand management
DoEE	Department of the Environment and Energy (Commonwealth)
DP&E	Department of Planning and Environment (NSW)

Easement	A collection of rights allowing an entity to undertake certain activities on land owned by another person. Easements acquired by Ausgrid are created by a lease, a transfer granting easement, an instrument registered with a deposited plan, or by acquisition.
EGOWS	enhanced gravity oil water separator
EIS	environmental impact statement
ELF	extremely low frequency
Embodied energy	Embodied energy corresponds to the energy consumed by all of the processes associated with the production of building materials and components.
Embodied carbon	Embodied carbon includes the release of greenhouse gases during chemical processes and through other human-induced 'natural' releases into the atmosphere.
Embodied water	Embodied water is the volume of water required to produce a commodity or service.
Emergency works	Works for the purpose of maintaining or restoring infrastructure facilities or equipment in order to ensure public safety or to protect buildings or the environment due to: • a sudden natural event, including a storm, flood, tree fall, bush fire, land slip or coastal inundation, or • accident, equipment failure or structural collapse, or • damage caused by vandalism or arson, provided the works involve no greater disturbance to soil or vegetation than necessary and are carried out in accordance with all applicable requirements of the Blue Book.
EMF	Electric and Magnetic Fields: are part of the natural environment and are also produced wherever electricity or electrical equipment is in use. Power lines, electrical wiring, household appliances and electrical equipment all produce EMF. The electric field is proportional to the voltage and remains constant. The magnetic field is proportional to the load and varies continually depending on the time of day, week and year. As electric fields are naturally shielded, the electricity network generally contributes very little to the electrical fields measured inside a home or office building. For this reason most discussion on EMF usually focuses on magnetic fields.
EMR	Environmental Management Representative: a person generally appointed for large projects to independently review, audit and endorse a project's environmental activities.
ENA	Energy Networks Australia
Environmental impact	Any change in the environment whether adverse or beneficial, wholly or partially resulting from the development and use of land. The environment includes: • ecosystems and their constituent parts, including people and communities; and • natural and physical resources; and • the qualities and characteristics of locations, places and areas; and • heritage values of places; and • the social, economic and cultural aspects of these things.
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW.
EP&A Regulations	*Environmental Planning and Assessment Regulation 2000*
EPA	Environment Protection Authority

EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
EPI	Environmental Planning Instruments: made under Part 3 of the EP&A Act.
ES Act	*Electricity Supply Act 1995* (NSW)
ESA	Environmental Site Assessment
ESCP	erosion and sediment control plan
ESD	Ecologically sustainable development: is development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased.
GHG	greenhouse gas
GIS	gas insulated switchgear
Ha	hectare
Hz	hertz
IARC	International Agency for Research on Cancer
ICES	International Committee on Electromagnetic Safety, IEEE Standards Association Standards Board,
ICNG	*Interim Construction Noise Guideline (DECC, 2009)*
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IECA	International Erosion Control Association
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
ISO	International Organization for Standardization
Jacking	A system of directly installing pipes behind a shield machine by hydraulic jacking from a drive shaft such that the pipes form a continuous string in the ground.
kV	kilovolts
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan: a type of EPI made under Part 3 of the EP&A Act.
LGA	Local Government Area
Likelihood	A qualitative description of probability or frequency.
Local heritage item	A place, building, work, relic, tree, moveable object, precinct, archaeological site or Aboriginal object that is: • identified as a heritage item (or by a similar description) in a local or regional environmental plan; or • an item of local heritage significance, as defined by the *Heritage Act 1977*, that is the subject of an interim heritage order in force under that Act; • or is listed as an item of local heritage significance in the State Heritage Inventory under that Act. Local heritage significance means significance to an area in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.
m	metre
m^2	metres squared

m^3	metres cubed
mm	millimetre
mG	milligauss
MVA	mega volt amps
NES	national environmental significance
NHMRC	National Health and Medical Research Council
NIEHS	National Institute of Environmental Health Sciences
Non-Aboriginal heritage	Any deposit, object or material evidence which relates to the settlement of NSW, not being Aboriginal settlement, with local or state significance under the *Heritage Act 1977*.
NPI	*Noise Policy for Industry (EPA, 2017)*
NPW Act	*National Parks and Wildlife Act 1974*
OCPs	Organochlorine pesticides
OEH	Office of Environment and Heritage
OEMP	operation environmental management plan
PAH	Polycyclic aromatic hydrocarbon
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PPS	parallel plate separator
Principal contractor	The Work *Health and Safety Regulation 2017* define a principal contractor as a person conducting a business or undertaking (PCBU – the term that includes employers) that commissions a construction project. A construction project can only have one principal contractor at any specific time. A principal contractor with management or control of a workplace must: • manage risks associated with the construction work • secure the workplace so unauthorised persons cannot enter • comply with all safe work method statement (SWMS) requirements for high risk construction work.
Proponent	The person proposing to carry out the activity, and includes any person taken to be the proponent of the activity by virtue of section 5.3 of the EP&A Act.
RAP	remediation action plan
REF	review of environmental factors
REP	Regional Environmental Plan: a type of EPI made under Part 3 of the EP&A Act.
RMS	Roads and Maritime Services
Road	Includes the airspace above the surface of the road, the soil beneath the surface of the road and any bridge, tunnel, causeway, road-ferry, ford or other work or structure forming part of the road. The road reserve is inclusive of the carriageway and the footpath.
SANSW	Subsidence Advisory NSW
SEPP	State Environmental Planning Policy: a type of EPI made under Part 3 of the EP&A Act.
SF_6	Sulphur hexafluoride
State Heritage Item	A place, building, work, relic, tree, moveable object, precinct, archaeological site or Aboriginal object that is: • an item of state heritage significance, as defined by the Heritage Act 1977, that is the subject of an interim heritage order in force under that

	Act; • or is listed as an item of state heritage significance in the State Heritage Inventory under that Act. State heritage significance means significance to the State in relation to the historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value of the item.
TCP	traffic control plan
TMP	traffic management plan
TPH	Total petroleum hydrocarbons
TPZ	Tree Protection Zone: the radius of the TPZ equals 12 times the diameter of the trunk at 1.4 m above the ground. For palms and ferns, the TPZ radius should not be less than 1m outside the drip zone.
TSB	thermally stable backfill (also referred to as fluidised thermal backfill)
TWA	time weighted average
Typical Daily Maximum Load	The electricity loading which is not exceeded more than 15% of the time for that year. Also referred to as the 85th Percentile.
V	volt: the unit of measure for voltage which is the pressure that electricity is pushed through the wire.
Vibration	Mechanical oscillations about an equilibrium point. Vibration can be caused by many different external sources, including industrial, construction and transportation activities. The vibration may be continuous (with magnitudes varying or remaining constant with time), impulsive (such as in shocks) or intermittent (with the magnitude of each event being either constant or varying with time).
WH&S	Workplace Health & Safety
WHO	World Health Organisation
ZS	Zone substation

Executive summary

The proposal

This review of environmental factors assesses the proposal to replace the switchgear at Concord zone substation.

The proposal includes the construction of a new switchroom at the site of the existing Concord zone substation.

Other activities that would form part of the project include:

- Decommissioning and removal of the existing switchgear,
- Installation of new switchgear and other associated equipment within the new switchroom,
- Cabling from the new switchroom to George Street, and
- Rebuilding transformer bays one, two and three along with the replacement of their associated transformers and feeder connections.

Construction of the proposal would be expected to commence in late 2021 with commissioning expected in early 2024, subject to assessment and approval.

Related projects subject to separate environmental impact assessments include the replacement of transformer number 1 and its associated feeder sections into George Street.

The proponent for the proposal is Ausgrid. As the proposal is not considered likely to significantly affect the environment, the determining authority is Ausgrid.

Background and need

Concord zone substation supplies a mixture of approximately 12,000 residential and industrial/commercial customers including critical customers like Concord Hospital.

The aging condition of the assets at this substation and the presence of oil circuit breakers (OCB's), results in an increased risk of equipment failure resulting in extended customer outages.

Proposal alternatives

The design and location of the proposal resulted from an options investigation. Alternatives considered include maintaining current supply infrastructure, replacement in situ and the development of a new switchroom (preferred option, this proposal).

Following the selection of the chosen option, this REF has assessed the proposal to ascertain whether there is likely to be a significant affect upon the environment to meet the requirements of section 5.5 of the *Environmental Planning and Assessment Act 1979* and clause 228 of the *Environmental Planning and Assessment Regulation 2000*. Proposal alternatives are described in section 3.

Statutory planning and legislation

This review of environmental factors has been prepared in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* and clause 228 of the Environmental Planning and Assessment Regulation 2000. Additional key legislation includes the *State Environmental Planning Policy (Infrastructure) 2007*, *Electricity Supply Act 1995* and *Protection of the Environment Operations Act 1997*.

Further information on the legislation applicable to this proposal is in section 4 and the consultation undertaken is in section 2.

Environmental impact assessment

This review of environmental factors investigates the potential environmental impacts associated with the construction, operation and maintenance of the proposal to replace the switchgear at Concord zone substation.

Key issues associated with the proposal were identified as ecology, amenity, construction management and associated logistics. A number of specialist assessments were undertaken to assist in assessing the environmental impacts (section 5).

Mitigation measures have been identified to address the impacts and to minimise any residual issues.

Proposal justification and conclusions

The proposal is driven by the aging condition of assets at the site. Supply reliability would be reduced if the proposal did not proceed. This work would help maintain a reliable supply of electricity, hence meeting Ausgrid's obligations in terms of safety, reliability, quality and continuity of supply.

Based on this review of environmental factors, it is concluded that the proposal:

- is not likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats
- is not on land that is, or is a part of, critical habitat or a wilderness area
- is not likely to have a significant impact on matters of national environmental significance, or a significant impact on the environment (for actions on Commonwealth land) or a significant impact on the environment on Commonwealth land (for actions outside Commonwealth land).

In making these conclusions, consideration of environmental significance was made with regard to clause 228 of the Environmental Planning and Assessment Regulation 2000 and *the Code of Practice for Authorised Network Operators*[1].

1 Introduction

1.1 Purpose of the review of environmental factors

The purpose of this review of environmental factors (REF) is to assess the potential environmental impacts of the proposal and determine appropriate mitigation measures to reduce those impacts. The findings of this REF would be considered when assessing:

- whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement as described under section 112 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act)
- the significance of any impact on threatened species as defined by the Biodiversity Conservation Act 2016 and the requirement for a species impact statement (SIS) or apply the Biodiversity Offsets Scheme
- the potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Commonwealth Minister for the Environment in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Ausgrid's determination of the proposal under Part 5 of the EP&A Act would be prepared separately to this REF.

1.2 The proposal

This review of environmental factors assesses the proposal to replace the 11kV switchgear at Concord zone substation.

The proposal includes the construction of a new switchroom at the site of the existing Concord zone substation.

Other activities that would form part of the project include:

- decommissioning and removal of the existing switchgear,
- installation of new switchgear and other associated equipment within the new switchroom,
- cabling from the new switchroom to George Street, and
- rebuilding transformer bays one, two and three along with the replacement of their associated transformers and feeder connections.

1.2.1 Proposal location

Concord zone substation is located at 31B George Street within the City of Canada Bay LGA. The site is approximately 115 metres (m) long and largely triangular in shape, giving a total area of approximately 0.2 hectare (ha). The site has been operated as a substation by Ausgrid since 1955.

Figure *1-1* shows the proposal location within Ausgrid's network area and the triangular nature of the site, inset.

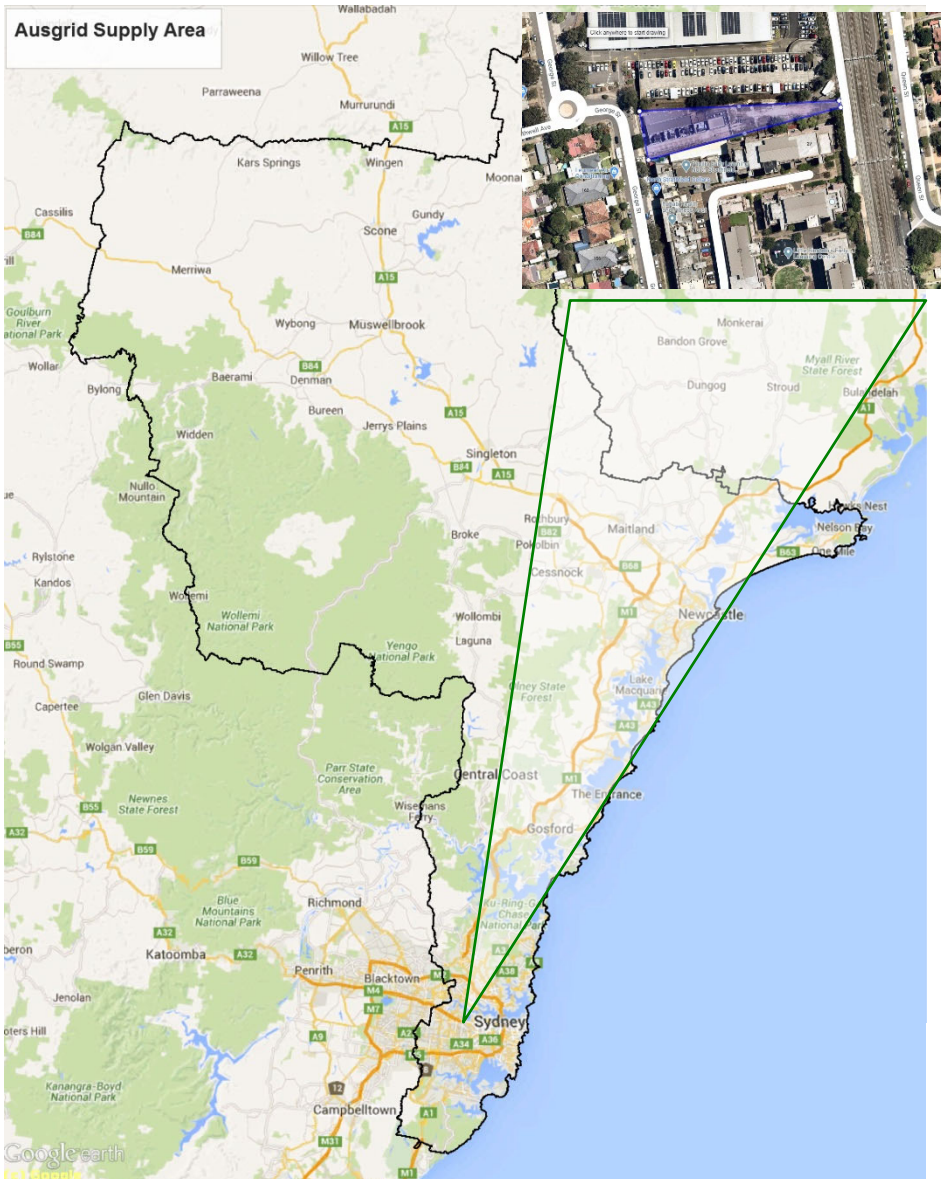

Figure 1-1: Proposed location within Ausgrid's network area

1.2.2 Proposal objectives

The objective of the proposal is to construct, operate and maintain a new switchroom at the site of the existing Concord zone substation to improve electricity supply and reliability for the Concord area. This meets Ausgrid's licensing requirements to provide a satisfactory standard of supply to consumers and cater for forecast future load growth.

Other objectives of the proposal are to:

- comply with relevant laws and standards
- meet Ausgrid's duty of care
- meet Ausgrid's obligations to plan for and supply reliable electricity
- maximise social, economic and environmental benefits
- minimise environmental, social and cultural impacts.

1.3 Background and need

Concord zone substation supplies a mixture of approximately 12,000 residential and industrial/commercial customers including critical customers like Concord Hospital.

The aging condition of the assets at this substation and the presence of oil circuit breakers (OCB's), results in an increased risk of equipment failure resulting in extended customer outages.

1.4 Study area

The study area is the environment that could be directly or indirectly affected by the proposal. For the purpose of this REF, the study area is defined as the preferred cable route, including a buffer area (the size is dependent on the issue being assessed).

Some potential impacts do not have clear physical boundaries. These are assessed on a broader scale and include land use, climate change, air quality, hydrology, waste disposal, fauna (including migratory birds), visual aesthetics, social and economic impacts.

The proposal site and surrounds are described in section 5.1.

1.5 Description of the proposal

1.5.1 Overview

This review of environmental factors assesses the proposal to replace the switchgear at Concord zone substation.

The proposal includes the construction of a new switchroom at the site of the existing Concord zone substation.

Other activities that would form part of the project include:

- decommissioning and removal of the existing switchgear,
- installation of new switchgear and other associated equipment within the new switchroom,
- cabling from the new switchroom to George Street, and
- rebuilding transformer bays one, two and three along with the replacement of their associated transformers and feeder connections.

The following sections details the physical structures (section 1.6), construction activities (section 1.7) and operation and maintenance activities (section 1.8) associated with the proposal. Figure 1-2 shows the proposed site plan including the indicative location of key components and ancillary facilities. Construction facilities and logistics would be determined by the principal contractor in conjunction with Ausgrid prior to the commencement of works.

1.5.2 Design

A copy of the conceptual design plans and drawings are contained within Appendix A.

It should be noted that the designs are accurate at the time of assessment; however some changes may be made to the final design either prior to, or during construction.

These changes are generally of a minor nature which would not materially affect the outcome of this environmental assessment.

If there are significant changes, the impacts would be reassessed unless the modification will reduce the overall environmental impact.

1.5.3 Easements

Easements, leases, licences and rights of way / carriageway over land are established to protect the future security and tenure of Ausgrid's assets including substations and distribution lines of all voltages, both overhead and underground.

Section 53 of the *Electricity Supply Act 1995* (ES Act) details the protection of certain electricity works which are not protected by easements.

Ausgrid has an easement/ right of way immediately north of Concord zone substation. Ausgrid have negotiated with the land owner to redevelop this easement to facilitate suitable construction access whilst enabling the egress of cabling and stormwater into George Street from the new switchroom building.

1.6 Physical structures

1.6.1 Building layout/structure

The building layout is predominantly controlled by the constraints of the site, electrical design requirements and Ausgrid's standards. The layout has been designed to minimise environmental impacts whilst meeting the needs of Ausgrid's electrical network. The design reflects the compact nature of the site.

The new substation building would be constructed to have a design life of 50 years. The building sits on an east-west axis to George Street and would be no more than 7m high relative to the existing ground level at its highest point at the western side of the building. The building would decrease in height as it moves to the east, into the gently sloping site to a maximum height of approximately 5.5m relative to existing ground level. See Appendix A.

The substation building has been designed with pre-cast neutral coloured concrete panels and a skillion roof constructed of colorbond. A façade treatment has been provided for along the southern boundary wall in consultation with neighbouring residents. The chosen façade detail can be found in Appendix A. Figure 1-2 illustrates the proposed site plan in relation to neighbouring premises.

An exterior walkway is located along the northern wall of the building to allow access for maintenance purposes and fire escape egress. The loading dock would be located on the buildings west to facilitate equipping via the existing transformer roadway.

The substation building would have a footprint of approximately 164m^2 and would consist of the following:

- combine 11 kV switchroom and control room holding:
  - 11 kV switchgear
  - 11 kV control and protection equipment
  - substation telecommunications

- batteries and associated chargers that would be stored in compact vertical racking
- building services
- other substation equipment.

- basement containing cabling and steelwork.

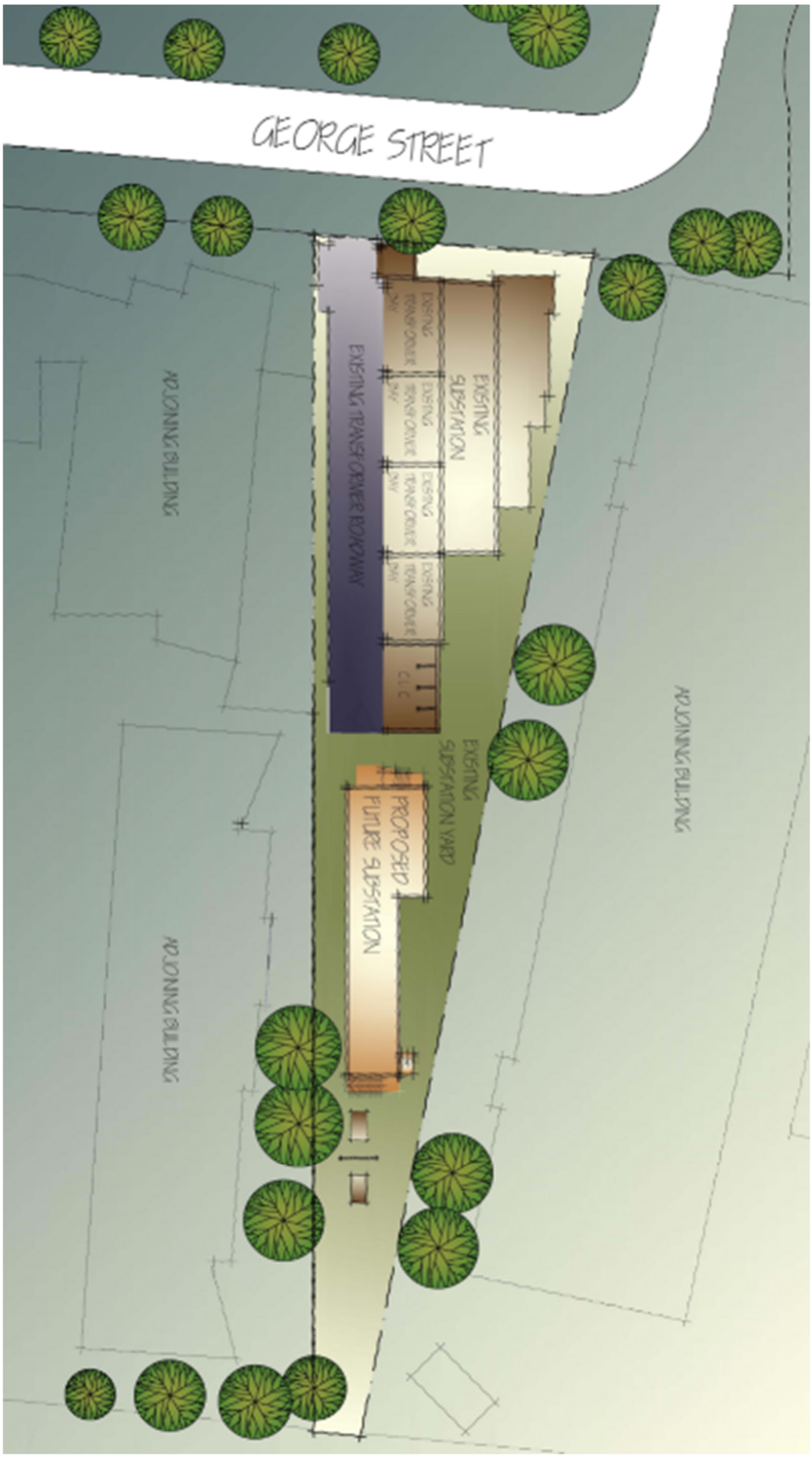

Figure 1-2: Proposed site plan

1.6.2 Electrical equipment

The layout of the new switchroom is shown in Appendix A and Figure 1-2.

The new switchroom would house 11kV switchgear, new batteries and control panels.

Two auxiliary kiosk type transformers would be located east, beyond the building footprint adjacent to the rail corridor as shown in Appendix A.

The Concord zone substation site has four transformers. The switchroom building will accommodate a bank of 11kV cables from each transformer. Two banks of cables would egress the switchroom building within a cable chase along the easement to the sites north. The other two banks of cables would egress to George Street through the existing sites transformer roadway, see Appendix A. Cabling would occur progressively in conjunction with transformer replacement and transformer bay rebuilding.

The modification of the earthing system includes extension of the existing buried earth grid in the present substation and the embedded earthing in the concrete of the switchroom building. A grid of copper conductors approximately 500 mm under finished ground level would be installed for the earthing system of the new switchroom. The earthing system ensures safety and correct protection operation under fault conditions.

1.6.3 Utilities

The existing Concord zone substation largely provides for utilities at the site.

Augmentation of existing utilities at the site will be required to allow for construction and extend to the new switchroom building, whihch include:

- stormwater connections
- 11kV underground cable connections

  fibre optic connections
- hydraulic services – pressurised potable water including fire-hydrants.

The easement needs to be cleared of vegetation to allow for the installation of 11kV cables and stormwater. Across the approximate 100m length, work would also include the:

- removal of fluid filled cables
- relocation of Telstra fibre.
- relocation of domestic water pipe.

1.6.4 Lighting

The proposed switchroom building would have external lighting for night purposes, which would only be used when required for operational works, which may occur out of hours works from time-to-time. All lighting would comply with Australian standards[2].

Most external lighting will be motion detected. On the southern façade, lighting is to be an architectural type wall mounted luminaire. Flood lights at the eastern and western boundaries would be positioned such that light is not directed to the southern boundary.

1.6.5 Fencing and signage

The site boundary of the substation would remain as it is. There will be a mix of fencing types. In some situations, there will be a need for substation security fencing, however its use will be limited to only where necessary, chiefly to the north of the development. A diplomat perimeter fence will be used where possible. Specifically, a 2.4 metres high diplomat fence will be installed extensively along the southern boundary.

Signage would be required during construction and would be maintained throughout the operational life of the substation. During construction signage would be displayed in accordance with Workplace Health and Safety (WH&S) Regulations for construction sites. This would include warning and protective equipment signs.

During the operational life of the substation warning signs will continue to be in place and gates padlocked at all times except when in immediate use. Standard signs include “High Voltage – Keep Out”, “Authorised Personnel Only”, “Trespassers will be Prosecuted”, “Protective Equipment must be Worn” and an Ausgrid Logo Sign for identification of the substation.

1.6.6 Access and parking

During operation, all site access would remain via George Street and the existing Concord zone substation entryway. Access would allowed via an existing easement on the northern boundary of the property to the extent as outlined in the landowner agreement. Primary access will remain via the substations existing transformer roadway.

Further details of access and parking during construction works are outlined in section 1.8.1.

1.6.7 Stormwater

The site drainage system comprises pits and pipes which would collect water from sealed surfaces within the transformer roadway and from the roof of the substation building.

The switchroom building footprint would take approximately 25% of the remaining greenfield site. Much of the area would be permeable therefore the impact is not expected to be significant.

Ausgrid’s structural engineers have checked the contribution of the now decommissioned oil containment tank system for the Transformer bay bunds to the streets stormwater system. It was found that the recent installation plate separators across all transformer bays 100% offset the increased flows generated by the new building work. Therefore, the pre-development discharge of the total site to the streets stormwater system is not exceeded by the proposed development of the total site.

Therefore, no additional on-site detention, above ground or below ground tanks would be installed for the new building.

The new switchroom building would connect to the stormwater system in George Street via the easement immediately north of the site. Refer to Appendix A for further detail.

1.6.8 Landscaping and replacement planting

Reinstatement would be undertaken at the site following construction work. Reinstatement is likely to take the form of turf. Reinstatement within the substation yard will be gravel to minimise maintenance and the tracking of sediments on to George Street.

However, native plantings which are suitable for placement in proximity to the Ausgrid network may be form part of the reinstatement works to facilitate an increase in amenity to the site, where necessary.

1.7 Construction activities

The precise construction methodology would be determined at the post-contract / construction stage of the proposal. The works would be undertaken by a contractor, selected after a competitive tendering process as a design and construct package, who would be responsible for detailed design and planning all construction processes, including scheduling and overall timing of works.

The specifications included in the competitive tendering process would include a requirement to comply with the scope and mitigation measures detailed in this REF, and conditions of any other approvals or permits obtained in relation to the proposal. The mitigation measures detailed in this REF must be included in the Ausgrid / contractor construction environmental management plan (CEMP).

The anticipated works for the proposal would include:

- survey work
- establishing structures such as fencing and hoarding
- installing pre-construction mitigation measures, such erosion, sediment and water quality controls, fencing sensitive areas
- relocating utilities, services and signage
- clearing vegetation within the substation footprint and to facilitate access (section 5.10)
- establishing a construction compound on the site
- establishing temporary construction facilities
- bulk earthworks
- erecting retaining walls and install drainage
- constructing an access road and associated retaining wall that would facilitate safe construction access
- constructing foundations
- constructing a combined switchroom and main control room
- excavating feeder trenches
- pile driving / auguring / boring
- laying conduit / cable and backfilling
- civil work associated with the rebuilding of transformer bays
- pulling feeders through conduits
- storing and stockpiling equipment
- dewatering
- jointing
- testing and commissioning
- reinstating roads or pavements
- rehabilitating topsoil and re-vegetation
- restoring the site (including general site clean-up and removing site compounds, temporary construction facilities' and temporary environmental controls).
- purging and removing existing cables

1.7.1 Construction access, parking, site compounds and stockpiles

During construction, vehicle and pedestrian access to the proposed site would be from George Street via a easement/ right of way to the sites immediate north. Protection measures such as cattle grates or sections of blue metal would be placed at the entrance to reduce the potential for tracking onto the roadway.

The easement is located at the top of a battered slope consisting of unconsolidated fill materials. Given the narrow width of the easement and its location, significant road building and retaining work would be required prior to the commencement of the building works. These ancillary works have been suitably designed by a civil engineer, measures will be put in place to prevent erosion and sedimentation into the neighbouring carpark. The consent of the landowner has also been obtained.

A dilapidation survey would be undertaken as part of the CEMP to establish a baseline which to assess any damage that might occur as a result of all works.

The George Street frontage of the existing Concord zone substation site would be vacant and available for use by the civil contractor during construction. Construction materials, portable buildings containing meal rooms, offices and amenities would most likely be positioned either at this location or towards the sites rear adjacent to the rail line. However, other suitable areas may be utilised in consultation with Ausgrid.

1.7.2 Construction fencing

Temporary construction fencing would be placed around the construction site and site compound, both to secure the site. During construction signage would be displayed in accordance with WH&S Regulations for construction sites. This would include danger and protective equipment signs.

1.7.3 Bulk excavation works

Excavation works during construction would be required for the building's cable basement. Based on the dimensions of the proposed switchroom, the approximated volumes of material to be excavated from the site is 460m^3. Additional 'over excavation' would be required to ensure the safety of workers and facilitate, batters, pits, joint bays and cable trenches.

1.7.4 Removal of existing fluid-filled cables

The existing decommissioned fluid-filled cables that run along the north of the Concord zone substation within the easement would be decommissioned, drained of free fluid and removed. Any ancillary equipment, such as tanks and gauge panels would also be drained of fluid and removed. These works would require excavation work within the existing easement before to the installation of two banks of new 11kV to George Street from the new switchroom.

Activities associated with the handling and transportation of the fluid and fluid equipment would be subject to the conditions of this REF, Ausgrid Network Standards, and relevant legislative requirements. This will also be reflected in a CEMP. Some of these conditions include:

- handling and transporting removed fluid and fluid-filled equipment in an environmentally safe manner and with due care to prevent spillage

- ensuring all personnel involved in the handling and transport of fluid and fluid-filled equipment are familiar with the procedures for using the spill kit
- promptly and appropriately cleaning up spills and leaks, notifying the relevant personnel and disposing of contaminated materials and equipment, appropriately.

Refer to Section 5.8 for additional information on excavating and removing decommissioned fluid -filled cables.

1.7.5 Vegetation clearing

All vegetation in proximity to the new building footprint and along the right of way would be cleared to enable unimpeded access to the site for plant and equipment, whilst allowing for the installation of conduits back out to George Street.

The two Chinese Hackberry's on the neighbouring residential property may be retained as part of this proposal. However, significant trimming would be required to facilitate construction. Their removal may be required pending construction methodologies and set-backs from the tree protection zone.

Impact on flora and fauna is described in section 5.10.

1.7.6 Temporary utilities

Given the existing nature of the substation at this location, it is not expected temporary utilities or amenities would be required at this site.

1.7.7 Installation of temporary environmental controls

Temporary environmental controls would be installed during the construction phase to mitigate potential environmental issues identified in section 5. Temporary controls for the proposal to mitigate such issues as noise and sediment would be installed where appropriate. These controls would be removed once construction is complete.

1.7.8 Timing and working hours

Subject to assessment and approval, work is expected to commence in late 2021 and would take approximately 30 months to complete.

The works would be broken into multiple stages of civil construction and electrical fit-out.

The first civil construction stage includes works associated with transformer driveway , refurbishment of transformer bay nearest George Street, retaining wall works along the northern easement, bulk excavation and construction of the building and hard stand areas. This work would commence starting in early 2021.

This would be followed by an electrical fit-out stage, which will facilitate delivery and installation of switchgear and other equipment. This work is expected to commence in mid-2023 (near the completion of the civil works).

Due to the complexity of project staging and need to maintain electricity supply to the surrounding network area through-out all works; there will be the need to have a number of smaller civil construction and electrical fit-out stages, which will extend until the completion of the substation works in late 2023.

The rebuilding of transformer bays two and three along with the replacement of their associated transformers and feeder connections would also occur progressively with transfers to the new switchgear occurring at the time of transformer replacement. This component of work may not be finished until 2026 according to the latest forecast program.

Works that would generate audible noise at any sensitive receiver would be undertaken between 7am and 6pm Monday to Friday and 8am and 1pm on Saturday. Audible works outside these hours may be undertaken where the following requirements are met:

- the works are emergency works, unplanned or unavoidable and the affected residents have been notified as far as reasonably practicable; or
- the works fall into one of the following categories and the affected residents are provided with a notification letter at least five days prior to the works:
    - the delivery of oversized plant or structures that cannot be undertaken during standard hours
    - maintenance and repair of essential public infrastructure that is unable to occur during standard hours
    - public infrastructure works that shorten the length of the construction phase and are supported by the affected community (this would require community consultation)
    - it is a requirement of a regulatory authority
    - where there is a demonstrated and justified need to operate outside the recommended standard operating hours and this is supported by Ausgrid's Project Manager, Community Relations Section and Environmental Services.

As the site is located within the City of Canada Bay Local Government Area. The standard hours for construction works, permitted by Council extend to 5pm on Saturday's. Subject to consultation with Ausgrid and the community, these hours may be considered acceptable.

Ausgrid acknowledge the NSW Government Gazette No 75 dated 9 April 2020 regarding work hours. This permits standard hours for construction works to be extended into Sunday 8am to 5pm, subject to conditions (See Section 4.3). Provided the Environmental Planning and Assessment Order 2020 remains in force, subject to direction under the contract, these hours may also be considered acceptable.

1.7.9 Resources and equipment

There would be approximately 30 staff employed during the construction phase. Ongoing maintenance requirements during operation would be undertaken by Ausgrid field personnel and contractors.

The following equipment may be used on site but is not limited to:

- piling rig (continuous flight or impact)
- large and small excavators
- concrete form work
- crane
- truck mounted augers and cranes
- trucks for material transport including soil, concrete and cable
- mulcher / chipper
- portable / roller compactor
- compressor
- traffic control vehicles
- power generator
- construction fencing

- water tankers
- skip bins
- tipper
- site and compound sheds
- temporary construction facilities
- associated minor construction equipment.

The following materials may be required for the proposal but is not limited to:

- concrete piles, footings and pre-cast panel walls
- asphaltic concrete
- various metals for reinforcement and structural steel, balustrades, fencing, signage, roof sheeting, fire suppression system, ventilation panels, electrical equipment, earth grid, electricity and communications conductors
- doors and windows including hardware
- downpipes, guttering and plumbing supplies
- paint
- lighting and fittings
- wall and floor tiling
- conduits
- strip drains
- Polythene membrane
- Colorbond cladding
- ladders
- laminate
- scaffolding
- blue metal gravel / crushed rock
- landscape supplies
- retaining walls
- TSB
- cables
- communication cables
- concrete and reinforcement.

1.8 Operation and maintenance requirements

Once the proposal is constructed, periodic maintenance would be required consisting of regular attendance on site by small work groups utilising light vehicles and small to medium plant. The site would not accommodate staff or contractors on a permanent basis, however access would be undertaken at any time for irregular short duration works, such as to identify defects and hazards such as damaged components, vandalism, degraded access tracks and reduced safety clearances.

No regular collection of waste is required. All wastes generated during the operational phase on site would be minimal and managed on an ‘as required’ basis.

The switchroom building has been designed to be low maintenance. Block work and high-quality metal / pre-cast concrete panels on the façade have been selected to reduce the maintenance requirements over the life of the building.

1.9 Decomissioning requirements - Removal of switchgear and transformers

On completion of the works, the existing 11kV switchgear, transformers and associated assets would be decommissioned and disconnected from the network.

All circuit breakers and transformers are to be drained of oil, and spring charges and other specific hazards removed from the equipment. All equipment is to be tested for PCB, removed and scrapped once spares have been salvaged where appropriate.

2 Consultation

2.1 Overview

Consultation defines the processes Ausgrid uses to seek views or provide information about our works and seek community feedback. Consultation can include a range of communication activities such as notification to community members and relevant authorities, community information displays, individual contact with residents and meetings with community and authority representatives. These activities are designed to ensure Ausgrid is aware of potential issues so essential electricity upgrades can be conducted with minimal impact on the local community.

The consultation undertaken as a part of this REF meets the Code of Practice for Authorised Network Operators. The outcome of this consultation is outlined in 2.3. Ausgrid will ensure its notification requirements under the Consultation Protocol to notify relevant agencies when works commence.

Consultation spans the entire proposal from the initial concept stage through to construction and as the new infrastructure is brought into service.

2.2 Statutory notification requirements

Under the ES Act Ausgrid is required to undertake 40 days notification to the local council for proposed works (other than routine repairs or maintenance works) so that Council has an opportunity to comment on the proposal. Submissions received under the ES Act from the relevant local council and Ausgrid's response are summarised in Table 2-1.

Under the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP), Ausgrid is the determining authority for electricity developments under Part 5 of the EP&A Act. While the work undertaken does not require council consent, the Infrastructure SEPP requires Ausgrid to undertake 21 days notification to Council in accordance with sections 13-15A of the Infrastructure SEPP, where the development:

- will have a substantial impact on stormwater management services provided by a council,
- is likely to generate traffic to an extent that will strain the capacity of the road system in a local government area,
- involves connection to, and a substantial impact on the capacity of, any part of a sewerage system owned by a council,
- involves connection to, and use of a substantial volume of water from, any part of a water supply system owned by a council,
- involves the installation of a temporary structure on, or the enclosing of, a public place that is under a council's management or control that is likely to cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential,
- involves excavation that is not minor or inconsequential of the surface of, or a footpath adjacent to, a road for which a council is the roads authority under the *Roads Act 1993* (if the public authority that is carrying out the development, on whose behalf it is being carried out, is not responsible for the maintenance of the road or footpath),

- is likely to affect the heritage significance of a local heritage item, or of a heritage conservation area, that is not also a State heritage item in a way that is more than minor or inconsequential,
- is on flood liable land, and will change flood patterns other than to a minor extent, or
- is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land.

Works involving a substation also require 21 days notification to occupiers adjoining that land. In some instances, other public authorities need to be notified under cl 16 of the Infrastructure SEPP.
Under the Infrastructure SEPP and ES Act, the following stakeholders were consulted about the proposal and asked to provide comment. The submissions received to date are summarised in Table 2-1 below

Specific licences, permits and approvals that require consultation are outlined in Table 4-1.

Table 2-1: Consultation responses

Respondent	Notification requirement	Comment raised	Ausgrid's response
Local Council	ES Act and Infrastructure SEPP	No submission was received from Council within the 40 day consultation period. However, after further consultation with Council the following comments were raised. Following completion of detailed design, Council seeks to be advised of the final scope of works.	Ausgrid will continue to keep Council updated as necessary. Ausgrid will share the final scope of works once finalised, in particular more details on underground cable works within George Street.
RMS/ Council	Road Act 1993	the permanent restoration of the road assets has to be undertaken by the Road authority. The utility authority who undertake the works within the road reserve has to make all disturbed area good with temporary works until Council undertake the permanent restoration after receiving the works order no. from Ausgrid.	Under Part 5 Division 2 Section 46 the Electricity Supply Act 1995, requires Ausgrid to make good any damage caused to impact roadways, footways or grass areas "public land". Ausgrid's standard practice across our network would be to consider a quote from Council to conduct the permanent restoration, but this will be considered against market tested rates before Ausgrid offers the restoration work to Council.
SydneyTrains	Infrastructure SEPP	No submission was received from SydneyTrains, as a result of the formal notice.	Ausgrid will continue to keep SydneyTrains updated as necessary.

Respondent	Notification requirement	Comment raised	Ausgrid's response
Telstra	Infrastructure SEPP	EME Guideline shows the majority of EME faces away from the vacant block and a clearance of 21.28m from the ground. Structural Engineer was to contact Ausgrid to discussed structural issues.	During the construction of the new switch room Ausgrid will likely be using excavators, piling rigs and mobile cranes. Although not anticipated, work would not take place inside either the red or yellow exclusion zones without further consultation with Telstra in the first instance. The Site Specific EME Guideline can be found in Appendix E. Although no further correspondence was received from Telstra on potential structural issues, Ausgrid will continue to keep Telstra updated as necessary.
Adjoining occupiers	Infrastructure SEPP	Are you able to provide further details on dimensions, siting, design finish of the building. The community newsletter doesn't contain a lot of detail.	Ausgrid is currently in the early planning phase of the project. We've engaged the Architect Kann Finch to assist developing the new building's exterior facade. The current concept design shows the footprint of the new building, which is situated at the rear of the existing substation. The height of the new building will be less than 7m high. When viewed from George St, the new building will largely be obscured by the existing substation, which will not be substantially modified as part of the works.
		What is the proposed new building height?	Ausgrid anticipates that it will be less than 7 metres from existing ground level. However, this will be finalised during the detailed design stage.
		Can the new building accommodate landscaping on the roof?	The new switchroom will not be built to accommodate landscaping on the rooftop, as this will add additional weight and waterproofing complexity to the building construction.

Respondent	Notification requirement	Comment raised	Ausgrid's response
		What are the health impacts of the new substation.	In relation to long term health impacts caused electric and magnetic fields (**EMF**) emitted from Ausgrid's substation; Ausgrid will comply with the guidelines set by the Australian Radiation Protection and Nuclear Safety Agency (**ARPANSA**). As part of the proposed upgrades to the substation Ausgrid will also ensure that EMF levels are well below those recommenced by ARPANSA. There are a number of common sources of EMF which can be found in the residential home, which are identified if you CLICK HERE. For additional reading, you can refer to Ausgrid's webpage on EMF, this webpage obtains its information from the ARPANSA website and can be access from the following link; https://www.ausgrid.com.au/In-your-community/Environment/Electric-and-magnetic-fields ARPANSA's EMF webpage is included below: https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/electricity
		The new switchroom may devalue properties and deter tenants.	Ausgrid has engaged an architect who has prepared two options for treating the facade of the new switchroom. Ausgrid had planned to present these treatments at a planned community forum; however, was unable to do so due to the COVID-19 restrictions imposed by the NSW Government In lieu of this forum, the two options were presented to adjoining residents via an online survey that recorded online votes between 17 April and 4 May 2020. The chosen façade treatment was chosen based on the preference of the majority of survey respondents.

Respondent	Notification requirement	Comment raised	Ausgrid's response
		Can the existing substation be expanded to accommodate new equipment?	The existing substation was built in the late 1950's and now supplies 12,000 residents/businesses in the Concord and North Strathfield area. For the duration of the project, the existing switchgear will need to remain operational while the new switchgear is installed. This will ensure that there is an uninterrupted electricity supply to all residents/businesses. The internal design of the existing substation is insufficient in size to accommodate both the existing switchgear and installation of new switchgear due to the size and shape of the substation. The only suitably sized vacant land available is at the rear of Ausgrid's property.
		The existing transformers create noise during the night.	Ausgrid understand that noise pollution emitted from transformers is an inconvenience to residents, especially during the evenings. In late 2019 Ausgrid replaced the eastern most transformer with a new modern-day equivalent, which is much quieter than the previous. Ausgrid has recently initiated a project to replace the western most transformer also with a modern-day equivalent. Ausgrid anticipates that this replacement will occur prior to construction commencing on the new switchroom. Ausgrid have now committed to replacing the remaining two transformers as part of the program of works at the site. These replacements would take place upon completion of the switchroom building work in coordination with its energisation and load transfers through to 2026.
		What is the project duration	The project is earmarked to commence in early 2021, with switchroom building completion slated for 2023.

2.3 Community consultation

2.3.1 Planning

Ausgrid has involved the community in the detailed planning of the proposal. Ausgrid's approach has been to seek feedback in allowing community members to influence Ausgrid's decision on the final project plans. Ausgrid seeks to balance community feedback with other project considerations in finalising the proposal and construction program.

Ausgrid is undertaking a range of activities to ensure community members are aware of the proposed activities and have an opportunity to provide feedback on the project.

Community engagement activities undertaken for this proposal include:

- Letters were sent to the local Member of Parliament; Hon. Ms Jodi McKay (State Member for Strathfield).
- Ausgrid consulted with the adjoining residents and the local community to outline the proposed works. During this process Ausgrid explained the proposal including designs and building and equipment layouts. This consultation enabled Ausgrid to achieve the most acceptable outcome for the wider community and minimise social and environmental impacts from the proposal.
- Community newsletters were and continue to be sent to the local community at key stages of the project to notify them of the proposal and provide construction information and information on how to contact Ausgrid's project team.
- Due to the NSW Government restrictions on public gatherings, an online survey was established and advertised within newsletters. This forum was used to gauge community interest in the project and present members of the public with a choice of switchroom colour schemes and façade treatments. The online survey was initially set between 17th April and 24th April 2020. However, was subsequently extended to 4th May 2020, with reminder notices being sent to adjoining residents.
- A toll free 1800 information line has been established and an email address made available for people wanting more information on the proposal or to ask questions or to raise issues during construction. Ausgrid has also listed information about the proposal on its website.
- Ausgrid notified and published this draft environmental assessment to local residents and interested members of the wider community on the Ausgrid website. This provided further opportunity for community members to learn more about the proposal and provide feedback to Ausgrid about the project.

A summary of the issues raised during community consultation is contained in Table 2-2.

Table 2-2: Community consultation issues summary

Issue	Response
Why does the substation need to be upgraded?	The substation's 11kV switchgear and associated equipment is aged and is ready to be retired. The switchgear needs to be replaced to enable Ausgrid to maintain a safe and reliable power supply to your area.
Will this affect the electricity supply in my home?	It is not anticipated that upgrades to the substation will have any direct impact on your electricity supply. In the unlikely event that we will need to temporarily interrupt your electricity supply during construction, you will be notified in advance.
How will the local area be impacted during construction?	Construction work will be contained within our substation site, except for the construction of some ductlines and connection of cables to the existing network. You may notice an increase in vehicle and truck movements in local streets, such as George Street. Residents in close proximity to the substation on George Street may also notice some noise, dust and vibration coming from the substation site during construction. However, this will be managed to minimise impacts on neighbouring properties. Ausgrid's construction site is small and will limit the space needed for necessary materials and equipment. As a result, parking and traffic along George Street will occasionally be affected from time-to-time to facilitate these large deliveries. Residents will be notified of any impacts prior to the works.
Will the new substation pose any fire or explosion risk to residents?	The new switchgear to be installed in the new switchroom, will replace the old switchgear which is reaching the end of its servicable life and is now obsolete technology. All new equipment installed in the new substation will comply with current Australian Standards. Likewise, the new substation building will comply with the Building Code of Australia (**BCA**) and Australian Standards.
What is the proposed new building offset from the southern boundary?	The setback from the southern boundary will be approximately three (3) metres.
Will electric magnetic field (EMF) levels increase as a result of the upgrade?	Future EMF levels have been modelled and measured as part of this environmental assessment and can be found in Section 5.3.
Community Information Session	Ausgrid had originally planned to hold a community information session at a local facility in Concord to allow a face-to-face discussion between the community and the project team regarding Ausgrid's proposed project. However, Ausgrid was unable to do so due to the COVID-19 restrictions imposed by the NSW Government. In lieu of this face-to-face forum, Ausgrid will provide regular community updates via newsletters, letters and our online website. The project website can be accessed here: *CONCORD SUBSTATION UPGRADE PROJECT*

2.3.2 Construction

Community engagement activities would continue as the project enters the construction phase.

This would include:

- A dedicated community liaison officer would be part of the project team during construction. This officer would work closely with construction personnel and the community to ensure the community is informed about upcoming works and potential impacts, and to address any construction related issues as quickly as possible.
- Notification to and door knocking of properties to provide stakeholders with more information on potential impacts, as required.
- A 24 hour community information line, project email address and web page.
- Notifications to residents and other neighbours seven days prior to the start of work that would provide information about the proposed construction activities, timing, work hours and traffic and parking arrangements, as well as details of how to find out more information or raise any issues with the project team.
- Specific notification requirements for any noisy works outside standard construction hours.

Additional consultation requirements and processes during construction are outlined in Section 5.4 and Appendix D.

3 Investigation of alternatives for the proposal

3.1 Assessing alternative options

As part of developing this proposal, consideration was given to alternative designs, construction and management options.

3.2 Do nothing

The first option considered to address the objectives of this proposal is to refrain from undertaking any further development of the network in the area (do nothing).

Benefits of this option would include reduced capital expenditure and no construction or operation impacts as described in section 5 of this REF.

The consequences of doing nothing as aged equipment begins to fail there would be supply interruptions (causing black outs) occurring more frequently and affecting more people. It would be extremely disruptive to commercial enterprises and residences throughout the area and contravene Ausgrid's licence obligations and corporate objectives to reduce the time and number of supply interruptions.

The 'do nothing' option is not a viable alternative.

3.3 Demand management

The main driver of this project is the replacement of aged infrastructure which is approaching the end of its serviceable life. The proposal would not provide any additional capacity and would be required regardless of any load reductions demand management would provide.

An assessment of non-network options concluded that it is not considered probable that sufficient demand management measures could be feasibly implemented to achieve the required demand reduction to make the project deferral technically and economically viable.

3.4 Network options

3.4.1 Insitu Switchgear replacement

This option would involve:

- Transfer 11kV load away to neighbouring zones,
- Build the extension to the 11kV Switchroom,
- Install new section of switchgear,
- Replace the first group of switchgear,
- Replace the second group of switchgear, and
- Replace the third group of switchgear.

This was not considered a viable option as it would:

- Increase construction duration,
- Put additional interim loading on other parts of the network, and
- Involve retrofitting existing substation building work.

3.4.2 Preferred network option

To replace the switchgear at Concord zone substation in a new building component on Ausgrid owned land to the immediate east of the existing substation.

Following the selection of the chosen site, Ausgrid prepared this REF to assess the environmental impacts of the proposal and to ascertain whether there would be a significant impact upon the environment to meet the requirements of sections 5.5 – 5.7 of the EP&A Act and clause 228 of the EP&A Regulations.

4 Environmental legislation

4.1 Environmental Planning and Assessment Act 1979

The EP&A Act is the primary legislation regulating land use planning in NSW. It provides the framework for the development of state and local planning instruments which, through their hierarchy, determine the statutory process for environmental impact assessment. This proposal satisfies the definition of an activity under Part 5 of the EP&A Act since it:

- may be carried out without development consent,
- is not exempt development, and
- would be carried out by a determining authority or requires the approval of a determining authority.

Under Part 5 of the EP&A Act, activities require a determining authority to take into account all matters affecting or likely to affect the environment by the proposed activity.

As Ausgrid is an authorised network operator under the *Electricity Network Assets (Authorised Transactions) Act 2015*, where it is carrying out development for the purposes of an electricity transmission or distribution network (within the meaning of State Environmental Planning Policy (Infrastructure) 2007) to be operated by the authorised network operator, Ausgrid is prescribed as a public authority under r277 of the Environmental Planning and Assessment Regulation 2000.

Environmental planning instruments (EPIs) are legal documents that regulate land use and development, including the type of assessment process required. EPI is the generic term used to describe state environmental planning policies (SEPP) and local environmental plans (LEP). As of 1 July 2009, regional environmental plans (REPs) are no longer part of the hierarchy of EPIs in NSW. All existing REPs are now deemed SEPPs.

The following EPIs that apply to the proposal area were considered:

- SEPP – Infrastructure
- SEPP – Major Development
- SEPP – State and Regional Development
- SEPP 19 – Bushland in Urban Areas
- SEPP 44 – Koala Habitat Protection
- SEPP 55 – Remediation of Land
- SEPP – Coastal Management 2018
- SEPP - Vegetation in Non-Rural Areas 2017
- City of Canada Bay Local Environmental Plan 2013

4.2 State Environmental Planning Policy (Infrastructure) 2007

Subject to certain exemptions, the Infrastructure SEPP allows development for the purpose of an electricity transmission or distribution network to be carried out by or on behalf of an electricity supply authority or public authority without development consent on any land.

Having regard to the Coastal Management SEPP, this proposal falls within the scope of the Infrastructure SEPP as an activity permissible without development consent. Consultation requirements under the Infrastructure SEPP are addressed in section 2.

4.3 Environmental Planning and Assessment (COVID-19 Development Extended Operation) Order 2020

On 8 April 2020, the Minister for Planning and Public Spaces extended these new weekend and public holidays construction work day hours to include public infrastructure projects with the Environmental Planning and Assessment (COVID-19 Development – Infrastructure Construction Work Days) Order 2020.

Allowing development to be carried out on weekends and public holidays ensures workers can practice social distancing without a loss of productivity or jobs on construction projects.

Construction sites must take all feasible and reasonable measures to minimise noise and noisy works like rock breaking, rock hammering, sheet piling, pile driving or similar activities are not permitted on weekends and public holidays.

This order will be in place until the crisis is over, or another order is made amending these measures.

4.4 Vegetation Clearing SEPPs

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP) requires certain approvals from either Council or the Native Vegetation Panel prior to clearing of certain vegetation. Clause 8 provides that authority to clear vegetation is not required under this Policy if it is clearing of a kind that is authorised under section 60O of the *Local Land Services Act 2013* (LLS Act). As this proposal is authorised under s60O(b)(ii) of the LLS Act, being [an activity carried out by a determining authority within the meaning of Part 5 of that Act after compliance with that Part], consent under the Vegetation SEPP is not required.

State Environmental Planning Policy No 19-Bushland in Urban Areas (Bushland SEPP) applies where works are proposed on urban land which is bushland zoned or reserved for public open space purposes, or adjacent to such land.

This proposal is not on or adjacent to such land, and as such consent is not required under the Bushland SEPP.

4.5 State Environmental Planning Policy (State and Regional Development) 2011

The SEPP (State and Regional Development) 2011 declares certain development to be State Significant Development (SSD) and State Significant Infrastructure (SSI), including Critical SSI. Applications for SSD and SSI must be accompanied by an Environmental Impact Statement (EIS).

The proposal is not a type of development listed in the schedules of the SEPP (State and Regional Development) 2011 as being SSD or SSI. The proposal would not have a significant impact on the environment (refer to section 6) and therefore does not require an EIS and as such would not be considered SSI.

On this basis, the SEPP (State and Regional Development) 2011 is not applicable to the proposal and it can be assessed under Part 5 of the EP&A Act through the operation of the Infrastructure SEPP.

4.6 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected species, populations and communities and heritage items. The approval of the Commonwealth Minister for the Environment is required for the following controlled actions:

- an action that may have a significant impact on matters of national environmental significance (NES),
- actions that are likely to have a significant impact on the environment of Commonwealth land, or
- actions taken on a Commonwealth land that are likely to have a significant impact on the environment anywhere.

The EPBC Act lists nine matters of NES which must be addressed when assessing the impacts of a proposal. An assessment of how the proposal may impact on matters of NES is provided in Table 6-2.

The assessment of the proposal's impact on matters of NES and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Accordingly, the proposal has not been referred to Commonwealth Department of Environment.

4.7 Electricity Supply Act 1995

The ES Act sets out the licensing regime on Ausgrid and provides a framework for the development and maintenance of electricity infrastructure. The ES Act allows Ausgrid to trim and remove trees, carry out works on public roads and acquire land.

The ES Act also requires that works (other than routine repairs or maintenance works) must not be undertaken without a minimum of 40 days consultation with relevant local councils. Any submission must be considered by Ausgrid. Consultation requirements under the ES Act are addressed in section 2.

4.8 Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides a framework for the licensing of certain activities and is administered by the Environment Protection Authority (EPA) (the statutory authority of OEH). Under the POEO Act, the EPA is the Appropriate Regulatory Authority for Ausgrid.

Schedule 1 of the POEO Act lists activities that require an Environment Protection Licence to operate. The need for a licence would be evaluated and sought prior to the commencement of construction, once a detailed construction method has been finalised.

Regardless of whether a licence is required, during construction and operation of the proposal, Ausgrid must ensure that:

- works do not pollute the environment,
- waste is classified, handled, transported and disposed of in accordance with EPA guidelines, and

- environmental incidents involving actual or potential harm to human health or the environment are reported to OEH.

4.9 Biodiversity Conservation Act 2016

Section 1.7 of the EP&A Act provides that the Act is subject to the provisions of Part 7 of the *Biodiversity Conservation Act 2016* (BC Act) and Part 7A of the *Fisheries Management Act 1994* (FM Act). The BC Act and FM Act contain additional requirements with respect to assessments, consents and approvals under the EP&A Act, concerning certain terrestrial and aquatic environments.

Where an activity being assessed under Part 5 is likely to significantly affect threatened species, s7.8 of the BC Act requires that a species impact statement, or biodiversity development assessment report must be prepared by the proponent. Where there are other likely significant effects on the environment, then an environmental impact statement would instead be required.

With respect to a development being assessed under Part 5, s7.2 of the BC Act provides that development or an activity is likely to significantly affect threatened species if:

- it is likely to significantly affect threatened species or ecological communities, or their habitats, or
- it is carried out in a declared area of outstanding biodiversity value.

Section 7.3 of the BC Act lists a number of factors to be considered in determining whether the proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. This includes, for example, whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The Schedules to the BC Act prescribe the following lists of specifies, ecological communities, and other matters relevant to this determination:

- threatened species;
- threatened ecological communities;
- extinct species, species extinct in the wild and collapsed ecological communities;
- key threatening processes;
- protected animals; and
- protected plants.

A desktop assessment indicated that no threatened flora or fauna species, population or ecological community would be affected by the proposal.

4.10 Summary of legislative requirements

Additional pieces of environmental legislation that apply to Ausgrid's network area were considered in the preparation of this REF, including:

- *Crown Lands Management Act 2016* (NSW)
- *Heritage Act 1977* (NSW)
- *Local Land Services Act 2013* (NSW)
- *National Greenhouse and Energy Reporting Act 2007* (NSW)

- *Native Title Act 1993* (Commonwealth)
- *Roads Act 1993* (NSW)
- *Rural Fires Act 1997* (NSW)
- *Water Act 1912* (NSW)
- *Water Management Act 2000* (NSW)
- *Water NSW Act 2014*

Specific licences, permits, approvals and notifications required for the construction, maintenance and operation of the proposal are outlined in Table 4-1.

Table 4-1: Summary of legislative requirements

Legislation	Authority	Requirement	Comment	Responsibility
Contaminated Land Management Act 1997	OEH	**Notification:** under s 60, by a person whose activities have contaminated land or a landowner whose land has been contaminated is required to notify OEH as soon as practicable after they become aware of the contamination.	If contamination is discovered the duty to report would be determined.	Ausgrid
EP&A Regulation	Ausgrid	**Consideration:** under cl.228, of the factors to take into account concerning the impact on an activity on the environment.	This REF has considered factors under cl. 228 in section 6.1.	Ausgrid
ES Act	Local Council	**Notification:** under s.45, of 40 days notice for the proposed electricity works.	Notification was given on 7th February 2020 (see section 1.1).	Ausgrid
Infrastructure SEPP	Local Council	**Notification:** under s. 13-15A, 21 days notice for substantial impact on council related infrastructure, local heritage, works in flood liable land that will change flood patterns other than to a minor extent, or certain development within a coastal vulnerability area	Notice was given at the same time as the ES Act notification.	Ausgrid
Infrastructure SEPP	Local Council and adjoining land occupiers	**Notification:** under s. 42, 21 days notice for works involving new or existing substations (including any associated yard, control building or building for housing plant).	Notification attached in Appendix B	Ausgrid
National Greenhouse and Energy Reporting Act 2007	Clean Energy Regulator (Commonwealth)	**Reporting:** under s. 19 a registered corporation is required to report information on energy production, energy consumption and the amount of greenhouse gas emissions for the facilities under their operational control on an annual basis by 31 October following the financial year for which they are reporting.	Reporting will be undertaken by 31 October each year.	Ausgrid / Contractor

Legislation	Authority	Requirement	Comment	Responsibility
POEO Act	EPA	**General:** Generally under Chapter 5, Ausgrid must not cause or permit water pollution, air pollution, noise pollution or land pollution.	Water management is addressed in section 5.6. Soil management is addressed in section 5.7. Air management is addressed in section 5.5. Noise management is addressed in section 5.4.	Ausgrid / Contractor
POEO Act	EPA	**Licence**: under s. 49, for scheduled activities not based on a premises for the transport of more than 200 kg of category 1 trackable waste in any load.	The need for / A licence for Category 1 trackable waste was given on X (see Appendix X) / would be obtained prior to construction / would be evaluated as part of preparation of the CEMP.	Contractor
POEO Act	EPA	**Licence**: under s. 49, for scheduled activities not based on a premises for the transport of more than 200 kg of category 2 trackable waste in any load.	The need for a license would be obtained prior to construction and evaluated as part of preparation of the CEMP.	Contractor
POEO Act	EPA	**General:** Under ss 147-148, Ausgrid is under a duty to notify the EPA and other relevant authorities of any pollution incident which is causing or threatening material harm to the environment, relating to an activity on land owned by Ausgrid or an activity being carried out by Ausgrid or a contractor.	Employees and contractors will be made aware of this obligation.	Ausgrid / Contractor
POEO Act	EPA	**General:** Under Part 5.6 Div 3, a person must not unlawfully transport or deposit waste, use a place as a waste facility without lawful authority, or provide false or misleading information about waste	Waste management is addressed in section 5.9.	Contractor

Legislation	Authority	Requirement	Comment	Responsibility
Protection of the Environment Operations (Waste) Regulation 2014	EPA	**General:** under cl. 43, Ausgrid must ensure that trackable waste is not transported unless Ausgrid: • Ausgrid holds a consignment authorisation; • Ausgrid has obtained and provided to the waste transporter a copy of the waste transport certificate; and the waste facility to which the waste is to be transported can lawfully accept waste of the type concerned.	Waste management is addressed in section 5.9.	Ausgrid
Water Act 1912	NSW Office of Water	**Permit**: under s. 113, to extract groundwater via any type of bore, well or excavation.	The need for a permit would be obtained prior to construction and evaluated as part of preparation of the CEMP.	Contractor

5 Environmental assessment

This section describes the existing environment of the study area and assesses the potential impacts of the proposal during construction, maintenance and operation. This section also prescribes the specific mitigation measures necessary to manage and control environmental impacts which consist of:

- specific mitigation measures prescribed in this REF (to be implemented during the design, construction, operation phases of the proposal or in combination)
- controls detailed in Ausgrid's NS174C Environmental Handbook for Construction and Maintenance.

Where there is an inconsistency, the proposal specific mitigation measures would prevail. Only specific mitigation measures are included in this REF, where required to minimise potential impacts.

Once the detailed construction methodology is known, the principal construction contractor would be responsible for developing further mitigation measures as required to meet both legislative requirements and the commitments in this REF. Section 0 outlines the requirements for preparing the construction environmental management plan (CEMP).

5.1 Land use

5.1.1 Existing environment

The proposal is located within the City of Canada Bay Council LGA. The proposal location is zoned Industrial (IN1) under Canada Bay Local Environmental Plan 2013. The land adjacent to the proposed site comprises:

- high density residential to the south,
- commercial to the north,
- a rail corridor to the east, and
- low density residential to the west.

The site is currently owned by Ausgrid who have operated an existing substation at the site since 1955. The proposal would be located at this Ausgrid property. Ausgrid have a 3m wide easement along the northern property boundary from George Street.

There is an existing Sydney Water easement that runs along the southern boundary of Ausgrid's site out onto George Street. It contains underground infrastructure.

5.1.2 Potential impacts

The proposal is consistent with the objectives and land use zoning of the LEP. The neighbouring high density residential properties to the sites south are relatively new to the area. Careful consultation with those residents immediately adjacent to the proposal and architectural consideration is required to ensure impacts are minimised.

Short term impacts on the surrounding land use during the construction phase of the proposal would include increased traffic intensity (section 5.15), noise (section 5.4) and

visual (section 5.14) impacts. Road building for construction access along our easement to the sites north is discussed in section 1.7.1.

Ausgrid is in consultation with a Sydney Water Coordinator to ensure the acceptability of our proposal in relation to their easement and utilities. Any encroachment into the subsurface or air space would be subject to Sydney Water approvals.

Once constructed, the proposal would form part of the existing substation and thus not restrict access. The proposal would have the benefit of facilitating both existing and future surrounding land uses in the region by providing a reliable supply from the electricity network.

5.1.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-1.

Table 5-1: Land use mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Consult with affected stakeholders about the proposal.	✓	✓	
Provide information via a free call 1800 number, email address and Ausgrid's website for people wanting more information.	✓	✓	
Targeted consultation with those residents immediately to the south of the proposal.	✓		
Road building for construction access across our easement to be left in a better state upon completion and subject to agreement with the landowner.	✓		✓
The easement encroachment along the sites southern side is subject to Sydney Water's approval.	✓		
Architectural consideration given to the buildings fixtures and finishes in consultation with those residents immediately to the south.	✓		

5.1.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to land use for reasons including:

- the proposal is located at the site of an existing substation,
- construction related impacts would be minor, localised and short-term,
- a reliable supply of electricity would allow existing land uses to continue, and
- mitigation measures outlined in section 5.1.3 would readily manage potential impacts.

5.2 Climate change

5.2.1 Existing environment

Climate change describes both changed average climatic conditions, such as increased temperature and lower average rainfall, as well as changes in the patterns of extreme events, including increased frequency and intensity of storms.

Greenhouse gas (GHG) emissions are defined by the GHG Protocol[3] and international standards[4] as scope 1 (direct emissions), scope 2 (indirect emissions from the consumption of purchased energy) and scope 3 (other indirect emissions).

The proposal is not located in low-lying areas near coastal locations.

5.2.2 Potential impacts

A risk assessment[5] of predicted climate change impacts on power infrastructure and the assets and services that they provide, considered the following climate change scenarios:

- higher average temperatures,
- more frequent occurrence of extreme temperatures (days over 35 °C),
- lower average rainfall,
- more intense extreme rainfall events,
- increased lightning strikes,
- higher evapo-transpiration,
- higher sea level and storm surge events, and
- more frequent extreme fire danger days.

The risk assessment showed that the key risks to power infrastructure would include extreme events, accelerated degradation of materials and structures, and resource demand pressures. In relation to the proposal, it is expected that the likely impact of extreme weather events would be low. This is because the switchroom building would be enclosed and the feeder and distribution cables would enter and leave via underground cables, which would protect the substation equipment from extreme events

Similarly, impacts related to the accelerated degradation of materials and structures would be low, as most of the electrical equipment and cables would be enclosed or underground. However, any exposed equipment and structures would be covered by specified epoxy paint and/or be of galvanised steel to reduce or eliminate accelerated degradation. The potential risk to underground feeders due to groundwater levels creating a more saline environment is expected to be low given that the underground cables are sealed in PVC casing.

Current climate predictions anticipate that extreme heatwaves would increase in frequency and intensity, potentially generating an increase in electricity demand for air conditioning at the same time as the efficiency of the transmission is reduced by up to 30% due to high temperatures[7]. This increased demand has the potential to place pressure on the resource supplied and increase capacity constraints and maintenance requirements of the substation. However, the new switchgear and associated equipment would increase the reliability of the electricity supply within the region.

Therefore, the new supply infrastructure would have a greater ability to withstand the increased pressure on the supply network.

Greenhouse gas emissions

Scope 1 emissions are direct GHG emissions produced from sources within the boundary of the proposal and as a result of the proposal's activities. Emissions arising from the construction of the proposal include those from vehicles and machinery used for materials delivery and handling, excavation, rehabilitation works, waste transport and general construction activities. The major contributor would be the consumption of fuel by transport vehicles.

The switchroom building would house gas insulated switchgear (GIS) technology which utilises sulphur hexafluoride (SF_6), a known GHG. SF_6 was selected due to its excellent insulation properties and more compact design that requires fewer raw materials. The quantitative contribution of SF_6 to global warming is below 0.1% with respect to the other manmade GHGs[6].

There is the potential for unintentional discharge of SF_6 during maintenance of the GIS. The total amount of SF_6 within the substation would be approximately 540 kilograms (kg), however the largest compartment would contain approximately 74 kg. If losses were to occur it is likely that they would occur from one compartment only and not all 540 kg would be lost.

During operation, all electrical equipment would be monitored and maintained to reduce the likelihood of any leaks and to maximise the operating efficiency of the substation. This would include the installation of gas density meters on each compartment to detect a drop in pressure. These meters would send an alarm if the pressure drops below a present level which would allow action to be taken to rectify the leak. This (and handling of SF_6 in accordance with appropriate guidelines) would ensure that losses of SF_6 to the atmosphere are minimised, which would reduce its impact on atmospheric GHG concentrations.

Ausgrid's assets are subject to regular maintenance and monitoring to ensure all equipment is operating effectively. Minimal staff would be required to attend the asset thus limiting associated vehicle use and scope 1 emissions.

Under the *National Greenhouse and Energy Reporting Act 2007*, Ausgrid is required to report information on energy production, energy consumption and the amount of greenhouse gas emissions for the facilities under their operational control on an annual basis by 31 October following the financial year for which they are reporting.

Scope 2 emissions are GHG emissions generated from the production of electricity, heat or steam that a proposal consumes, but which is physically produced by another facility. These emissions would arise primarily from the consumption of electricity through network losses when the proposal is in operation. Electrical losses are an inevitable consequence of the transmission of electricity through the transmission and distribution network, and the energy consumed in these losses must be generated by power stations. This energy is sourced from the Australian electricity market, which is primarily supplied from coal-fired power stations that emit GHGs.

The proposal would not result in a change in the capacity of the network and hence in scope 2 GHG emissions.

Scope 3 emissions are those GHG generated in the wider economy that are related to a proposal but are physically produced by another facility. The main source of scope 3 emissions related to this proposal is from power stations supplying the National

Electricity Market (currently predominantly coal fired) that supply the electricity retailers who sell power to customers in the area supplied by this proposal. The power stations supply electricity from a variety of generation sources with varying emission levels. The end user can influence the level of scope 3 emissions by the amount of electricity they consume and by selecting to receive green power.

The proposal would not result in a change in the capacity of the network and hence in scope 3 GHG emissions.

Since 2003, all electricity retailers in NSW have been governed by licence conditions that require them to reduce greenhouse emissions arising from the energy they sell in NSW. This *Greenhouse Gas Abatement Scheme*[7] is a compulsory legal framework under the ES Act that requires the retailers to take actions to reduce emissions through a range of measures in order to meet a benchmark level set by the NSW government. The benchmark currently applicable is 5% below the Kyoto baseline year of 1990, on a per capita basis.

All electricity retailers who would utilise the proposal to transport electricity to customers are bound by this regulatory framework. The framework provides a robust, market based means to manage scope 3 emissions to the level determined to be appropriate by the NSW government. It should be noted that any effort to reduce emissions from electricity usage supplied by NSW electricity retailers outside this framework would be accompanied by a reduced requirement on the retailers themselves, and no net reduction would result.

Sea level rise

Under clause 228(2)(p) of the EP&A Regulation, Ausgrid is required to consider any impact on coastal processes and hazards, including those under projected climate change conditions. The NSW Government acknowledges that increased sea levels will have significant medium to long-term social, economic and environmental impacts for development located in the coastal zone. However, the proposal is not within the coastal zone.

5.2.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-2.

Table 5-2: Climate change mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 8 of NS174C Environmental Handbook.		✓	
Report information on energy production, energy consumption and the amount of greenhouse gas emissions to the Clean Energy Regulator for the facilities on an annual basis by 31 October the following year.			✓

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
The climatic conditions to which the plant, equipment and the major substation shall be exposed are detailed in: • AS/NZS 1170 Structural design actions • AS 2067 Substations and high voltage installations exceeding 1kV A.C. • Bureau of Meteorology Climate maps for the "Annual Rainfall", "Minimum Temperatures" and "Maximum Temperatures" in New South Wales • Engineers Australia "Australian Rainfall and Runoff – A Guide to Flood Estimation" • NS185 Major Substations Building Design Standard • NS186 Major Substations Civil Works Design Standard	✓		
Materials sourced from local suppliers where cost effective and no impact on engineering properties.	✓	✓	
Fluorescent tube lighting and water efficient appliances would be installed to reduce electricity use during operation.	✓	✓	✓
Recycled materials considered and used where cost effective and no impact on engineering properties.	✓	✓	
All plant and equipment would be turned off when not in use.		✓	✓

5.2.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to climate change for reasons including:

- construction related impacts would be minor and short-term,
- Ausgrid designs its network to comply with network standards and relevant Australian Standards,
- in the context of existing GHG, the proposal would result in an insignificant increase to GHG emissions,
- installation of gas density meters and handling of SF6 to avoid losses into the atmosphere, and
- mitigation measures outlined in section 5.2.3 would readily manage potential impacts.

5.3 Electric and magnetic fields

5.3.1 Existing environment

Electric and magnetic fields (EMF) are part of the natural environment and are present in the atmosphere and static magnetic fields are created by the Earth's core. EMF is also produced wherever electricity or electrical equipment is in use. Power lines,

electrical wiring, household appliances and electrical equipment all produce EMF. Power-frequency EMF (also known as extremely low frequency or ELF EMF) have a frequency of 50 Hertz (Hz).

An electric field is a region where electric charges experience an invisible force. The strength of this force is related to the voltage, or the pressure which forces electricity along wires. Electric fields can be present in any appliance plugged into a power point which is switched on. Even if the applicant itself is turned off, if the power point is on, an electric field will be present.

Electric fields are strongest close to their source, and their strength diminishes rapidly as we move away from the source Electric fields are shielded by most objects, including trees, buildings and human skin.

A magnetic field is a region where magnetic materials experience an invisible force produced by the flow of electricity, commonly known as current. The strength of a magnetic field depends on the size of the current (measure in amps), and decreases rapidly with increasing distance from the source. While electric fields are blocked by many common materials, this is not the case with magnetic fields.

Ausgrid's existing sources in the Concord area include underground and overhead power lines and the existing Concord zone substation.

In terms of exposure within the home, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) advise that:

> *Magnetic fields within homes can vary at different locations and also over time. The actual strength of the field at a given location depends upon the number and kinds of sources and their distance from the location of measurement. Typical values measured in areas away from electrical appliances are of the order of 0.1 - 2 mG.*

Typical magnetic field measurements and ranges associated with various appliances and feeders are shown in Table 5-3.

Table 5-3: Magnetic field measurements and ranges associated with various appliances and feeders

Magnetic Field Source	Range of Measurement (in mG)
Electric Stove	2-30
Computer Screen	2-20
Television Screen	0.2-2
Electric Blanket	5-30
Hairdryer	10-70
Refrigerator	2-5
Electric Toaster	2-10
Electric Kettle	2-10
Electric Fan	0.2-2
Street Distribution Line (directly underneath)	2-20
HV Transmission Overhead Line (directly underneath)	10-200

Source: Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), Measuring magnetic fields.

5.3.2 Potential impacts

The question of EMF and health has been the subject of a significant amount of research since the 1970s. This large body of scientific research includes both epidemiological (population) and laboratory (at both a cellular and an organism level) studies.

Research into EMF and health is a complex area involving many disciplines, from biology, physics and chemistry to medicine, biophysics and epidemiology.

EMF at levels well above the recognised international exposure guidelines can cause both synaptic effects perceived as magneto-phosphenes in the sensitive retinal tissue (magnetic fields) and micro-shocks (electric fields). The exposure guidelines are in place to protect against these biological effects.

No single study considered in isolation will provide a meaningful answer to the question of whether or not EMF can cause or contribute to adverse health effects. In order to make an informed conclusion from all of the research, it is necessary to consider the science in its totality. Over the years, governments and regulatory agencies around the world have commissioned many independent scientific review panels to provide such overall assessments.

As part of the Health and Aging Portfolio, Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a Federal Government agency charged with the responsibility for protecting the health and safety of people, and the environment, from EMF.

ARPANSA[8] advises that:

"The scientific evidence does not establish that exposure to the electric and magnetic fields found around the home, the office or near powerlines causes health effects"

These findings are consistent with the views of other credible public health authorities. For example, the World Health Organization (WHO)[9] advises that:

> *"Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the WHO concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields."*

Similarly, the U.S. National Cancer Institute concludes that:

> *"Currently, researchers conclude that there is little evidence that exposure to ELF-EMFs from power lines causes leukaemia, brain tumors, or any other cancers in children."*
>
> *"No mechanism by which ELF-EMFs could cause cancer has been identified. Unlike high-energy (ionizing) radiation, ELF-EMFs are low energy and non-ionizing and cannot damage DNA or cells directly."*
>
> *"Studies of animals exposed to ELF-EMFs have not provided any indications that ELF-EMF exposure is associated with cancer, and no mechanism has been identified by which such fields could cause cancer."*

Health Canada, the Canadian national public health authority advises that:

> *"There have been many studies on the possible health effects from exposure to EMFs at ELFs. While it is known that EMFs can cause weak electric currents to flow through the human body, the intensity of these currents is too low to cause any known health effects. Some studies have suggested a possible link between exposure to ELF magnetic fields and certain types of childhood cancer, but at present this association is not established."*
>
> *"The International Agency for Research on Cancer (IARC) has classified ELF magnetic fields as "possibly carcinogenic to humans". The IARC classification of ELF magnetic fields reflects the fact that some limited evidence exists that ELF magnetic fields might be a risk factor for childhood leukaemia. However, the vast majority of scientific research to date does not support a link between ELF magnetic field exposure and human cancers. At present, the evidence of a possible link between ELF magnetic field exposure and cancer risk is far from conclusive and more research is needed to clarify this "possible" link."*

International Commission On Non-Ionizing Radiation Protection - 2010[10]

> *"It is the view of ICNIRP that the currently existing scientific evidence that prolonged exposure to low frequency magnetic fields is causally related with an increased risk of childhood leukaemia is too weak to form the basis for exposure guidelines. In particular, if the relationship is not causal, then no benefit to health will accrue from reducing exposure."*

EMF health guidelines

The two internationally recognised exposure guidelines are ICNIRP and IEEE.

- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 2010.
- International Committee on Electromagnetic Safety, Institute of Electrical and Electronics Engineers (IEEE) in the USA 2002.

ARPANSA's advice[11] is that "The ICNIRP ELF guidelines are consistent with ARPANSA's understanding of the scientific basis for the protection of people from exposure to ELF EMF."

The following table summarise the magnetic field exposure Reference Levels for IEEE and ICNIRP.

Table 5-4: Magnetic field Reference Levels at 50Hz for IEEE and ICNIRP

	IEEE 2002	ICNIRP 2010
GENERAL PUBLIC		
Exposure general	Not specified	2,000 mG
Exposure to head and torso	9,040 mG	Not specified
Exposure to arms and legs	758,000 mG	Not specified
OCCUPATIONAL		
Exposure general	Not specified	10,000 mG
Exposure to head and torso	27,100 mG	Not specified
Exposure to arms and legs	758,000 mG	Not specified

Prudent avoidance

Since the late 1980s, many reviews of the scientific literature have been published by authoritative bodies. There have also been a number of Inquiries such as those by Sir Harry Gibbs in NSW[12] and Professor Hedley Peach in Victoria[13]. These reviews and inquiries have consistently found that:

- adverse health effects have not been established,
- the possibility cannot be ruled out, and
- if there is a risk, it is more likely to be associated with the magnetic field than the electric field.

Both Sir Harry Gibbs and Professor Peach recommended a policy of prudent avoidance, which Sir Harry Gibbs described in the following terms:

> *"…. [doing] whatever can be done without undue inconvenience and at modest expense to avert the possible risk …"*

Prudent avoidance does not mean there is an established risk that needs to be avoided. It means that if there is uncertainty, then there are certain types of avoidance (no cost / very low cost measures) that could be prudent. These recommendations have been adopted by the ENA and other electricity transmission and distribution businesses

Energy Network Australia position

The Energy Networks Australia (ENA) is the peak national body for Australia's energy networks. ENA represents gas and electricity distribution, and electricity transmission businesses in Australia on a range of national energy policy issues.

ENA is committed to taking a leadership role on relevant environmental issues including power frequency EMF. ENA and its members are committed to the health and safety of the community, including their own employees.

The ENA's position is that adverse health effects from EMF have not been established based on findings of science reviews conducted by credible authorities. ENA recognises that that some members of the public nonetheless continue to have concerns about EMF and is committed to addressing it by the implementation of appropriate policies and practices.

ENA is committed to a responsible resolution of the issue where government, the community and the electricity supply industry have reached public policy consensus consistent with the science.

Policy statement

1. ENA recommends to its members that they design and operate their electricity generation, transmission and distribution systems in compliance with recognised international EMF exposure guidelines and to continue following an approach consistent with the concept of prudent avoidance.
2. ENA will closely monitor engineering and scientific research, including reviews by scientific panels, policy and exposure guideline developments, and overseas policy development, especially with regard to the precautionary approach.
3. ENA will communicate with all stakeholders including assisting its members in conducting community and employee education programs, distributing information

material including newsletters, brochures, booklets and the like, liaising with the media and responding to enquiries from members of the public.

4. ENA will cooperate with any bodies established by governments in Australia to investigate and report about power frequency electric and magnetic fields.

Magnetic field from 11kV switchgear

Ausgrid engaged an independent consultant to model the magnetic field from the 11kV switchgear to the nearest sensitive receivers at the sites south. Refer to Appendix E.

The level of magnetic field emission from the three-phase electrical switchboard is directly proportional to the strength of the electric current, internal arrangement and thickness of the metal housing of the equipment.

Figure 5-1below shows how magnetic fields would dramatically decline with distance from the source.

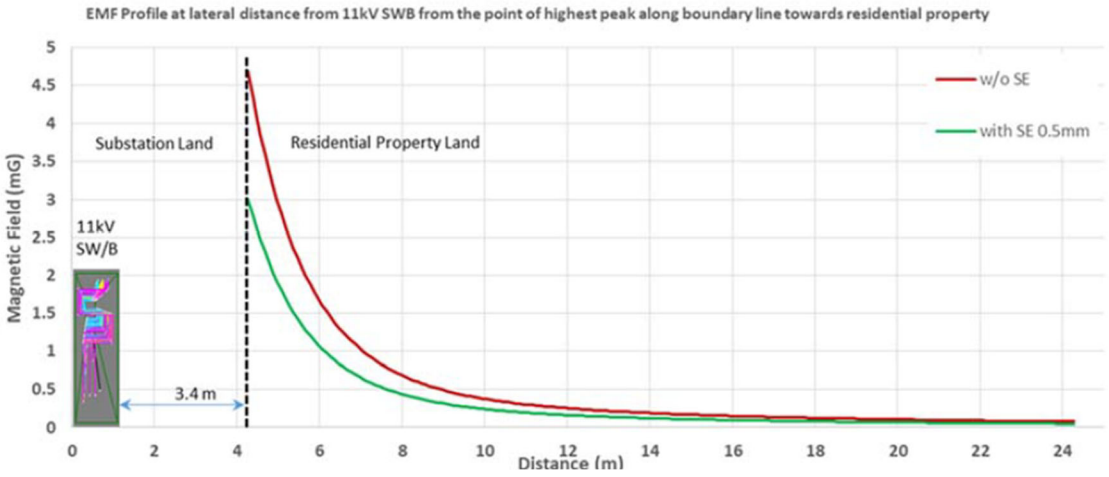

Figure 5-1Magnetic Field from the southern boundary wall, south towards the nearest receiver

Based on time weighted average (TWA) load forecasts, the compact, metal clad arrangement of the equipment installed and maximising set back distances modelling shows a magnetic field of 3mG at the nearest permanent receiver.

This is less than 1% of the health guideline limit for public exposure to magnetic fields.

Magnetic field from 11kV cabling

Three phase underground 11kV cabling would enter and exit the switchgear. Two banks of 11kV cables would egress the new substation building via a cable chase in Ausgrid's easement on the north side of the substation from George Street. Two banks of 11kV cables would egress the site with Ausgrid's existing transformer roadway along the sites south.

Ausgrid engaged an independent consultant to model the magnetic field from the two banks of 11kV cables egressing the site through the existing transformer roadway to the nearest sensitive receivers at the sites south. Refer to Appendix E.

Again, the level of magnetic field emission from the three-phase underground cabling is directly proportional to the strength of the electric current, the phase arrangement and the construction methodology employed.

Figure 5-2 below shows how magnetic fields would dramatically decline with distance from the source.

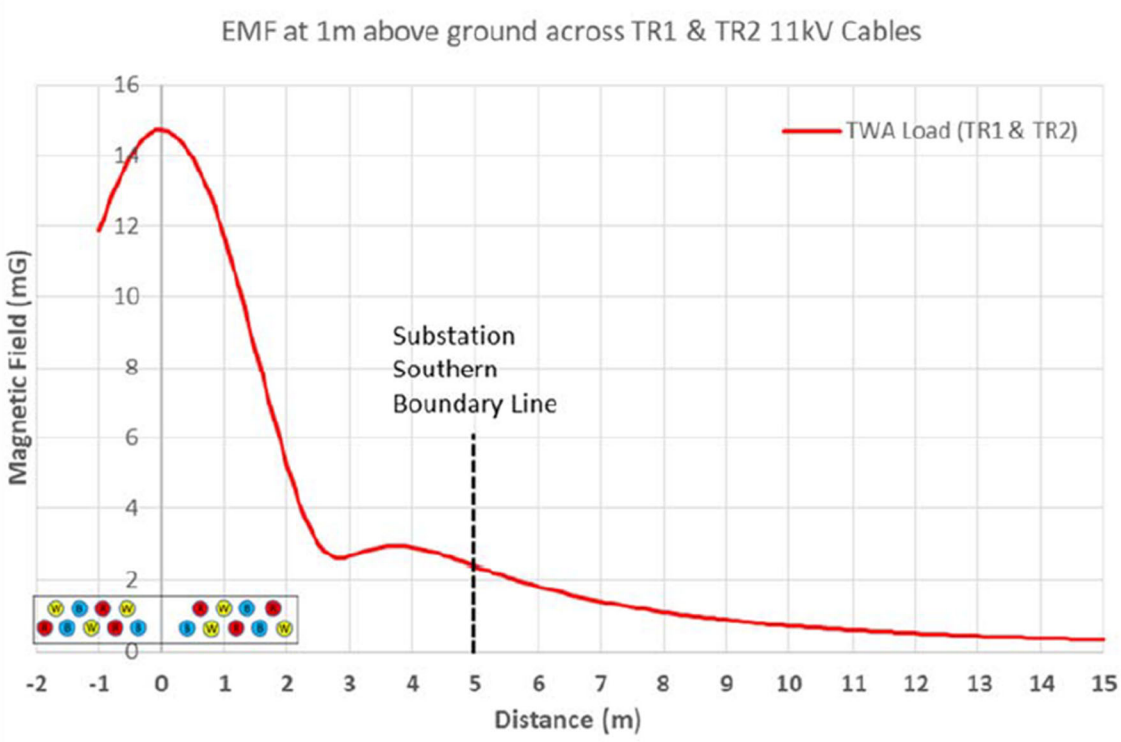

Figure 5-2 Magnetic Field from the 11kV cables within the transformer roadway, south towards the nearest receiver

Based on time weighted average (TWA) load forecasts, the compact construction methodology and optimal phase arrangement, modelling shows a magnetic field of 2.1mG at the property boundary.

This is less than 1% of the health guideline limit for public exposure to magnetic fields.

Cumulative impact

Adding magnetic fields from multiple sources is a complex and dynamic exercise. In the residential environment there are a multitude of sources such as existing power lines, service lines, household wiring, appliances and water pipes. Each of these sources has a unique magnetic field profile which changes over time depending on the nature of the source and load it is carrying. This is further complicated by the fact that magnetic fields are vectors which have direction as well as size.

While attempting to define the exact field at a particular point in time is therefore problematic, it can be shown that the addition of two magnetic fields with random orientation is slightly less than the root-sum-of squares. In practice this means that one field has to be only slightly larger than the other to dominate the average result. For example, if one field is half the size of the other field, it makes only a 10% difference to the total.

Cumulative impact considerations do not change the conclusions that the project will comply with relevant guidelines and the principles of prudent avoidance.

5.3.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-5.

Table 5-5: EMF mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Implement no costs and very low measures to reduce magnetic field exposure, including where relevant: • employing compact underground cabling arrangements in trefoil configuration, • using optimal phase arrangements when installing underground cables, and • orientating equipment to maximise setbacks from adjoining receivers.	✓	✓	

5.3.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to EMF for reasons including:

- the proposal would meet all relevant International health guidelines, including the, ICNIRP Guideline, and IEEE Standard,
- Ausgrid is proposing a number of mitigation measures (outlined in section 5.3.3) which will substantially reduce the magnetic field exposure, and
- the proposed mitigation measures are consistent with the prudent avoidance and precautionary policies and advice of the ENA, ARPANSA and WHO.

5.4 Noise and vibration

5.4.1 Existing environment

The normal day time noise and vibration environment near the proposed switchroom site is primarily influenced by traffic flows, the rail corridor, small businesses in the adjacent commercial industrial area and the existing substation.

The existing environment is characterised by a mix of commercial, light industrial, and residential receivers. Concord zone substation shares a high density residential neighbour to the sites immediate south which also boarders rail corridor to the east.

Apart from residences potential sensitive receivers proximate to the site include a child care centre immediately south of the existing substation site within the above mentioned residential complex.

5.4.2 Potential impacts

Noise during construction

The Interim Construction Noise Guideline (ICNG) [14] outlines that a quantitative assessment must be undertaken where works are likely to affect an individual or sensitive land use for more than three weeks in total.

A specialist CNVIA was undertaken for the proposed construction works. The following activities were undertaken as part of the CNVIA:

- attended and unattended noise monitoring at locations indicative of noise sensitive receivers,
- establishment of project specific airborne noise construction goals based on monitored existing noise levels,
- prediction of construction noise levels from proposed construction works, and
- recommendation of environmental noise control options/management practices.

Worst case scenario construction noise will exceed adopted noise management levels for those adjacent receivers. However, noise impacts predicted are representative of peak noise generating construction works in unison without implementation of any mitigation measures. Significantly lower noise levels are ultimately predicted as various mitigation measures are implemented for the project.

A number of mitigation measures were recommended, key measures are reproduced in section 5.4.3.

The results of the qualitative assessment indicate that there is potential to have an adverse noise impact. To address the ICNG requirements, the appropriate noise practice would be to employ all reasonable and feasible mitigation measures outlined in the attached Construction Noise and Vibration Management Plan (Appendix D).

Vibration during construction

As part of the CNVIA, a specialist vibration assessment was undertaken for the proposed construction works. Vibration monitoring is not considered necessary to track adopted perceptible (disturbance) and structural vibration objectives as there would be no rock breaking activities performed for the project.

Depending on the chosen construction methodology and sites lithology, Geotechnical engineers may recommend vibration monitoring. Any discussions around vibration monitoring should consider the criteria outlined in Appendix D. Similarly, if vibration induced complaints are identified monitoring should be undertaken as a precautionary and construction mitigation considered in consultation with the civil contractor.

Noise and vibration during operation

Impacts to the noise and vibration environment will be associated with construction activities associated with the proposal and not during operation. The progressive replacement of Transformers 1,2 and 3 will result in a decrease in operational noise.

Noise modelling demonstrates that there would be no additional reflective noise at those adjoining residences to the south as a result of the new building component, see Appendix D for Noise modelling undertaken for the project.

5.4.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-6.

Table 5-6: Noise and vibration mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 4.2 of NS174C Environmental Handbook.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
All workers to be made aware of the presence of sensitive receivers in the area and the need to avoid impacts.		✓	
Provide at least four clear business days notice to affected receivers prior to starting work unless it is emergency works or it is discussed with the affected receivers face-to-face. Include the following information in notification letters: • a description of the works and why they are being undertaken, • details of the works that will be noisy, • work hours and expected duration, • what is being done to minimise the impacts (eg respite periods), and • a 24 hour contact number.		✓	
Consult with affected sensitive receivers (eg schools, restaurants, hospitals, childcare, etc)		✓	
Schedule particularly noisy works in consultation with the adjoining childcare facility.		✓	
Apply noise blankets or equivalent to the construction fencing along the southern boundary of the construction site, refer to Appendix D for specifications.	✓	✓	
Plan the site layout to minimise movements that would activate audible reversing and movement alarms.		✓	
Provide respite periods for affected receivers, for example: • one hour respite after every three consecutive hours of high impact activities, and • one day respite after every three consecutive days of high impact activities. Specific respite would be dependent on the nature of prior consultation, the complaint and project schedule.		✓	
In consultation with Ausgrid, do not affect a receiver for more than two nights in a one-week period.		✓	
Due to unavoidable work requirements or due to a regulatory licence requirement (eg RMS, network outages) out of hours and/or night works may be required.		✓	
Where the ROL stipulates out of hours work the works must meet the requirements of NS174C Environmental Handbook, out of hours work criteria or a site specific noise management plan.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with the mitigation measures of the Construction Noise and Vibration Management Plan, Appendix D.	✓	✓	
Ausgrid acknowledge the NSW Government Gazette No 75 dated 9 April 2020 regarding work hours. This permits standard hours for construction works to be extended into Sunday 8am to 5pm, subject to conditions (See Section 4.3). Provided the Environmental Planning and Assessment Order 2020 remains in force, subject to direction under the contract, these hours may also be considered acceptable.		✓	

Generally, works would be undertaken between 7am and 6pm Monday to Friday and 8am and 1pm on Saturday. Between 7am and 8am on Saturdays, works that are inaudible to the nearest residential premises are allowed. Audible works may be undertaken outside of these hours if:
• the works are emergency works AND the affected residents have been notified as far as reasonably practicable; OR
• the works fall into one of the following categories AND the affected residents are provided with a notification letter at least four clear business days prior to the works:
  • the delivery of oversized plant or structures that require special approval,
  • maintenance and repair of essential public infrastructure that is unable to occur during standard hours, or
public infrastructure works that shorten the length of the work and are supported by the affected community (this would require community consultation).
		✓	

For out of hours work, consider notifying local council.		✓	
Provide information via a free call 1800 number, email address and Ausgrid's website for people wanting more information.	✓	✓	
Provide signage outside the worksite detailing who is undertaking the works and a 24 hour contact number.		✓	
Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Keep a register of any complaints, including details of the complaint such as date, time, person receiving complaint, complainant's contact number, person referred to, description of the complaint, time of verbal response and timeframe for written response where appropriate.		✓	
Undertake condition reports of structures within five metres of vibration generating works.		✓	
Refer operational noise enquires to Ausgrid Environmental Services.			✓

5.4.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to noise and vibration for reasons including:

- the construction would be temporary and noisy activities controlled,
- potential noise impacts would comply with the OEH ICNG,
- potential noise impacts would comply with the NSW NPI,
- potential vibration impacts would comply with the OEH *Assessing Vibration: A Technical Guidelines* (2006), and
- mitigation measures outlined in section 5.4.3 would readily manage potential impacts.

5.5 Air quality

5.5.1 Existing environment

No air quality monitoring has been undertaken specifically for the proposal, however OEH operates a comprehensive air quality monitoring network comprising sites throughout the State, with particular focus on the main population centres of Sydney, the lower Hunter and the Illawarra.

Key air pollutants as identified under the National Environment Protection Measure for Ambient Air Quality include: carbon monoxide, nitrogen dioxide, lead, sulphur dioxide, photochemical smog and fine particles. Photochemical smog (as ozone) and, to a lesser extent, fine particles remain significant issues in NSW.

Air pollution includes the emission of odours, smoke, fuel or any other substances to the air. There are many substances in the air that may impair human health as well as the health of plants and animals or reduce visibility. Impacts from pollutants are governed by the intensity of pollutant discharges, type of discharges and the prevailing weather conditions.

The existing (background) air quality environment is highly influenced by the urban / industrial activities occurring in the vicinity of the proposal. Influences of existing air quality include emissions from transportation, major industry, commercial operations

and domestic activities. There are no major industrial sources of air emissions in the vicinity of the proposal.

5.5.2 Potential impacts

Direct potential impacts from the proposal to the local air quality would be limited to dust and emissions from vehicles, plant and equipment generated during the construction.

Exhaust emissions are likely to include nitrogen oxides, carbon monoxide, sulphur oxides, hydrocarbons and total suspended particulates. All equipment would be fitted with approved exhaust systems and maintained to keep vehicle exhaust emissions within accepted standards.

Activities that may generate dust include wind erosion of exposed surfaces, movement of topsoil during excavations and disturbance of stockpiles, movement of vehicles and equipment over unsealed roads, trenching, boring, establishing of access tracks / pads / nibs, clearing vegetation and site preparation works.

Ausgrid's internal guidelines require an erosion and sediment control plan (ESCP) or soil and water management plan (SWMP) for construction works where soil disturbance is greater than 250 m^2. The ESCP must be produced in accordance with the 'Blue Book'[15]. The site would be inspected for compliance with the ESCP during the construction phase. During the operational phase works would comply with the erosion and sediment control measures detailed in section 2.1 of NS174C Environmental Handbook.

No site specific ESCP is required for this project because:

- of the nature and location of the site,
- approximately 120m2 bulk disturbance area, and
- spoil would be loaded directly onto trucks and transported from site.

Impacts to air quality would be predominantly associated with construction activities. A number of mitigation measures (described in section 5.5.3) would be implemented to ensure the amount of dust and emissions generated is minimal and would not affect the surrounding environment.

5.5.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-7.

Table 5-7: Air quality mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 2.1 Erosion and sediment control and 4.1 Air of NS174C Environmental Handbook		✓	
All workers to be made aware of the presence of sensitive receivers in the area and the need to avoid impacts.		✓	
Use water sprays to dampen (but not saturate) disturbed surfaces, at material transfer points and during construction and demolition.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Visually monitor dust levels during works. If dust is leaving site, causing a safety issue or complaints are received suspend works and consider mitigation options and/or substitute with an alternate process.		✓	
Restrict traffic movement and vehicle speeds over disturbed areas and unsealed roads.		✓	
Stabilise any long term exposed areas (bare earth) by covering, or with soil binders such as polyvinyl acetate (PVA) or latex sprays or introducing a crushed aggregate (not recovered/ recycled).		✓	
Where wetting is insufficient, install dust barriers on fences and gates.		✓	
Use dust collection devices (such as vacuum) on construction and rock breaking equipment where available.		✓	
No stockpiling on site without consulting Ausgrid in the first instance. All spoil to be tipped into a truck or skip bin.		✓	
Position vehicles and equipment where the fumes will least affect receivers, where practicable.		✓	✓
Do not leave vehicles or equipment idling when they are not needed.		✓	✓
Handle SF6 and other gases in accordance with approved work practices.		✓	✓

5.5.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to air quality for reasons including:

- construction related impacts would be minor, localised and short-term,
- once in operation, the proposal would have no more than minor impact on air quality, and
- mitigation measures outlined in section 5.5.3 would readily manage potential impacts.

5.6 Hydrology

5.6.1 Existing environment

The closest waterway to the proposal is Powell's Creek Canal located 300m to the sites west. The waterway drains into Homebush Bay and the Parramatta River. This is also the closest built waterway to the proposal.

Both stormwater and surface water flows from the site and drains into Powell's creek. The site has a catchment area of 0.12 Ha and runoff through the proposal is likely to be low.

That area adjacent to the canal is considered to be flood prone. That area immediately west of Rothwell Avenue, Concord to the canal is mapped as a flood planning area. Ausgrid's proposal is located 150m east of this area, it is not in a flood planning area and not considered to be flood prone land.

Based on the identified hydrological conditions, groundwater underlying the site is expected to flow in a north westerly direction. However, the nature of the underlying geology and topography is expected to influence the movement of groundwater.

The standing groundwater level was measured at be 7.6m below current surface levels (28th November 2019) during the geotechnical investigation (Appendix D).

5.6.2 Potential impacts

Bulk earthworks would cause considerable surface disturbance to the site during the initial phases of construction, creating the potential for erosion and sedimentation off site. During and after wet weather, dewatering may be required to allow work to continue. Onsite treatment of the water would be undertaken to remove sediment from the water. In the case of an unlikely incursion of groundwater in the basement, groundwater would be tested for water quality and if it satisfies the adopted criteria, it would be discharged to the drainage channel/stormwater drain on George Street.

No spoil would be stockpiled on site. The spoil would be trucked from site upon excavation. Temporary stockpiling may be required to facilitate this process. If this is required, Ausgrid is to be consulted in the first instance.

At the conclusion of earthworks all exposed soil surfaces would be stabilised to pre-existing condition. This would ensure that there would be no long term erosion or sediment impact. Where possible this stabilisation would happen progressively during construction.

The construction works would involve vegetation removal along the construction access corridor which is not within a riparian corridor as defined by the Guidelines for riparian corridors on waterfront land[16]. This vegetation removal would result in areas of exposed soil material that would be prone to erosion in a rainfall event. However, due to the proposal size, duration of works, the natural topography constraints and the proximity to Ausgrid's northern neighbouring carpark it is proposed to implement temporary sediment control measures both on site and along the construction access way to minimise any impacts from additional sediments entering the surrounding environment.

The removal of ground cover from the site and replacement with hardstand has the potential to impact hydrology and water quality, in particular causing an increase in nutrient levels in stormwater runoff.

The switchroom building footprint would take approximately 25% of the remaining greenfield site. Much of the area would be permeable therefore the impact is not expected to be significant. Ausgrid's structural engineers have checked the contribution of the now decommissioned oil containment tank system for the Transformer bay bunds to the streets stormwater system. It was found that the recent installation plate separators across all transformer bays 100% offset the increased flows generated by the new building work. Therefore, the pre-development discharge of the total site to the streets stormwater system is not exceeded by the proposed development of the total site.

Groundwater is unlikely to be intercepted during excavation. The groundwater intercepted would require dewatering and possibly a licence under the *Water Act 1912*

or *Water Management Act 2000*. This licence would not be required during the operation of the proposal. The proposal has been designed so that the groundwater would not be impacted by works.

Water quality in the study area may be affected by spills of hydraulic oil and fuels from machinery or vehicles. Quantities of these products would be kept to a minimum and would be stored in a suitably bunded and covered area. Adequate storage and refuelling controls would be installed to mitigate impacts. Plant and equipment would also be maintained to minimise the potential for leakages.

5.6.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-8.

Table 5-8: Hydrology quality mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 2.1 Erosion and sediment control, 2.2 Water discharge and 2.3 Oil fuel and chemicals of NS174C Environmental Handbook.		✓	
All workers are made aware of the presence of stormwater drains on George Street and their outlet to Powell's Creek.		✓	
Maintain sediment controls, especially during periods of rainfall.		✓	
Remove temporary erosion and sediment controls as the site is stabilised or rehabilitation is complete		✓	
No stockpiling on this site. All spoil to be tipped into a truck or skip bin	✓	✓	
Stabilise disturbed areas promptly, this may include progressive rehabilitation		✓	✓
The construction accessway is to be established in accordance with Erosion and sediment control on unsealed roads (OEH, 2012) and Managing Urban Stormwater Volume 2C Unsealed Roads.		✓	✓
Organise a licensed taker to remove the water if the relevant discharge criteria cannot be met.		✓	✓
Investigate the existing sites redundant oil containment tank to function/ be retrofitted as a stormwater detention basin.	✓	✓	✓
Stabilise the main access road during construction to minimise the tracking of sediment onto George Street.		✓	
If dewatering of groundwater is required during construction, works would cease and additional testing would be undertaken to develop a Water Quality Management Plan.		✓	
Provide a secure and bunded area for the storage of fuel, oil or chemicals. This area would be imperviously bunded with a capacity to contain not less than 110% of the volume of the largest container.	✓	✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Prior to construction, nominate and sign post a plant refueling area.		✓	
Regularly inspect and maintain the oil containment system in accordance with relevant Ausgrid Network Standards.			✓
Store oil in a bund unless it is temporary storage.		✓	✓
Ensure a spill kit is readily available and workers and know how to use it.		✓	✓

5.6.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to hydrology for reasons including:

- construction related impacts would be minor, localised and short-term,
- once in operation, the proposal would have no impact on hydrology,
- potential hydrology impacts would comply with the Blue Book, and
- mitigation measures outlined in section 5.6.3 would readily manage potential impacts.

5.7 Geology and soil

5.7.1 Existing environment

The 1:100,000 scale Geological Map of Sydney (Sheet 9130, 1st edition, 1983), infers the site is underlain by black to dark grey shale and laminate of the Wianamatta Group.

A specialist geotechnical assessment was carried out by D&N Geotechnical on the site (Appendix D). The report concluded that:

- Fill was observed at all locations across the site, generally comprising fill for local site levelling, landscaping or underground services up to a depth of 1.6 m,
- Excavation within site soils and extremely to highly weathered bedrock units should be possible using conventional earth moving plant such as hydraulic excavators fitted with rock teeth, and
- Based on the proposed basement level (1.5 m - 2 m), bulk excavations are not expected to encounter permanent standing groundwater.

The topography of the landscape is relatively flat for most of the site with land generally sloping to the west. Site elevation is approximately 13 m Australian Height Datum (AHD). The slope of the land is considered gentle and has therefore not been classified as steep and erodible.

The proposed site is not within a mine subsidence area.

5.7.2 Potential impacts

The construction of the proposal would cause some minor soil instability. There would be less than 250 m^2 of soil disturbed at any one time, therefore an ESCP has not been

prepared. Parts of the site could be exposed for up to five months and as such temporary stabilisation techniques would need to be considered and employed where necessary consistent with NS174c.

The construction accessway would be unsealed which could cause a long term erosion issue. The track has been designed in accordance with *Managing Urban Stormwater Volume 2C Unsealed Roads*[17] and *Erosion and sediment control on unsealed roads – A field guide for erosion and sediment control maintenance practices*[18] and the long term impacts would be minimised by correct construction and embankment techniques.

Site soils including fill and residual clayey soils are expected to behave poorly if exposed to heavy construction traffic, particularly when wet.

The potential effects of noise and vibration on adjacent structures resulting from excavation equipment/pile driving and methods will need to be carefully considered by the contractor as part of the construction management plan. Dependant on the method of excavation/ retention proposed, further studies will be required to assess the effects of any vibration during the installation of the various wall types on neighbouring properties.

5.7.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-9.

Table 5-9: Geology and soil mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 2.1 Erosion and sediment control of NS174C Environmental Handbook.		✓	
All workers are to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
The potential effects of noise and vibration on adjacent structures resulting from excavation equipment/pile driving and methods will need to be carefully considered by the contractor as part of the construction management plan.		✓	
A platform of granular material such as road base or crushed concrete may be needed to support the construction plant.		✓	
Temporary stabilisation techniques would need to be considered and employed where necessary consistent with NS174c		✓	
Construct access tracks and undertake their maintenance in accordance with *Managing Urban Stormwater Volume 2C Unsealed Roads* and *Erosion and sediment control on unsealed roads – A field guide for erosion and sediment control maintenance practices.*	✓	✓	✓

5.7.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to geology and soil for reasons including:

- the construction would be temporary, localised, short term and transitory,

- reinstatement works would stabilise the proposed route once construction is complete,
- once in operation, the proposal would have no more than a minor impact on geology and soil, and
- mitigation measures outlined in section 5.7.3 would readily manage potential impacts.

5.8 Contamination

5.8.1 Existing environment

A desktop assessment of the study area showed the existing environment is a mixture of residential, commercial and industrial areas, the site is not listed on council or OEH's contaminated land register and there are several registered contaminated sites within 5 km of the proposal that are likely to present significant risk of harm. These are related to historical activities occurring at sites including Sydney Olympic Park and Rhodes Peninsula and do not encumber the Concord zone substation site.

There is the potential for the existing decommissioned fluid-filled feeders and pilot cables within the proposed construction accessway to have been treated with OCPs. Soils around the existing fluid-filled feeders may be contaminated with OCPs. There is very limited potential for exposure to the public from OCP contamination in soils, while the soils remain in-situ in the feeder trench. This is mainly due to the higher concentrations of OCPs in soils being within the cable trench at depth, under a concrete protective slab and the majority of the feeders being laid under roads. There may be minor localised areas where OCPs have mobilised in the soil if excavations for fault repairs have previously occurred on the feeders. OCPs are strongly absorbed to soils, have very low solubilities in water and are unlikely to be leached from the undisturbed in-situ soil into groundwater.

The geotechnical investigation notes that fill was observed at all locations across the site, generally comprising fill for local site levelling, landscaping or underground services up to a depth of 1.6 m. Where there is the presence of fill and given the age of this site, there is a possibility of asbestos containing materials.

During an inspection of two trial holes in the transformer bay one last year, indicators of contamination in the bottom of one of the excavations were observed at approximately 1.3m deep. The trial hole was adjacent to the wall of transformer bay two. A review of Ausgrid drawings indicates the existing transformer bay slab is placed on fill to a depth of up to 1.6m before encountering residual clays or shale bedrock. Transformer bay walls and other associated footings extend down to natural material.

There are no other potential sources of contamination in the study area or near the site that would trigger further investigation on Ausgrid's site prior to the commencement of works.

5.8.2 Potential impacts

Results from trial hole investigations would be used to ensure excavated spoil is appropriately classified and managed with respect to waste management requirements.

Although no asbestos was identified in the samples analysed, if asbestos is encountered in soil or old conduits or joint bays during construction, the works would

cease, access restricted and the asbestos managed and disposed of in accordance with the POEO Act, NS211 Working with Asbestos Products and EPA's Waste Classification Guidelines.

Soil quality may be affected by spills of hydraulic oil and fuels from equipment or vehicles. However, the extent would be localised and appropriate controls would minimise the potential for contamination to occur. Quantities of these products would be kept to a minimum and would be stored in a suitably bunded and covered area. Adequate storage and refuelling controls would be installed to mitigate impacts. Plant and equipment would also need to be maintained to minimise the potential for leakages. Any accidentally contaminated soil would be excavated, stockpiled, chemically classified for disposal and transported to an appropriately licensed waste facility.

Soils around the existing fluid-filled feeders would be assumed to be contaminated with OCPs unless sampling proved otherwise. Sampling may be undertaken to determine the presence of OCPs. Any sampling would be undertaken from below the protective slabs. If soils are not contaminated with feeder fluid (or anything other than OCP) they would be replaced in the trench to original depths where possible. Otherwise they would be classified in accordance with the NSW EPA's Waste Classification Guidelines and disposed of to a licensed waste facility. Testing for OCPs would be undertaken on any sections of the fluid-filled feeders and pilot cables being removed and they would be handled and disposed of accordingly.

Civil works undertaken within each transformer bay should be done so in consultation with Ausgrid's Environmental Services. Once the slab has been removed and excavation work is underway, Environmental Services will inspect fill materials as they are removed from each transformer bay. The removal of impacted spoil to natural material would be photographed. Where required, the excavated pit(s) would be sampled for validation prior to rebuilding each transformer bay.

If unexpected contamination is identified during construction, the works would cease, access restricted and the Ausgrid Environment Officer (EO) contacted to determine the nature and extent of the contamination. The EO will proceed to perform any reporting obligations, and implement any temporary and/or permanent measures required to contain the contamination under the contract.

5.8.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-10.

Table 5-10: Contamination mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 3.1 Asbestos, 5.1 Contamination and 5.4 Use of recovered materials of NS174C Environmental Handbook.		✓	
All workers are to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Civil works undertaken within each transformer bay should be done so in consultation with Ausgrid's Environmental Services. Once the slab has been removed and excavation work is underway, Environmental Services will inspect fill materials as they are removed from each transformer bay. The removal of impacted spoil to natural material would be photographed. Where required, the excavated pit(s) would be sampled for validation prior to rebuilding each transformer bay.		✓	
Toolbox talk is to include a discussion of the potential contamination at the site; Asbestos in fill materials and OCP's around old 132kV cables.		✓	
Segregate suspected contaminated spoil from clean spoil to reduce disposal costs, prevent cross-contamination of waste streams, and maximise potential for reuse of appropriate excavated materials (eg VENM).		✓	
Undertake testing to confirm preliminary waste classification and subsequent storage, transport, tracking, licensing and disposal requirements.		✓	
Provide a secure and bunded area for the storage of fuel, oil or chemicals. This area would be imperviously bunded with a capacity to contain not less than 110% of the volume of the largest container.		✓	✓
Temporarily store excavated known or suspected contaminated spoil in a covered, lined/ sealed skip or bulk storage bag or sealed container on-site for classification prior to disposal off site. Where there are site restrictions for on-site storage, store offsite. If storing more than 5 tonnes of spoil, use a licensed storage facility. There may also be a requirement for having a licence to transport the spoil.		✓	
If you think that you have found contamination, you must stop work immediately, restrict access and notify: • your supervisor, • Ausgrid's Environmental Services, and • your local safety advisor for WHS requirements.		✓	
Soil excavated from Ausgrid's 132kV fluid filled cable trenches must be contained in a plastic lined and covered secure bin to prevent water ingress or dust escape.		✓	✓
Any person handling the waste is trained in handling Scheduled Chemicals and methods of containing Scheduled Chemical spills and wears Personal Protective Equipment (PPE).		✓	
All packages / storage containers are clearly labelled and maintained in good order.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Where more than 50kg but less than 1 tonne is stored, ensure that: There is a clearly defined storage area with conspicuous warning notices identifying the area. The storage area is constructed to prevent discharge in the external environment. For soil this can be satisfied by storing in a lined and covered bin.		✓	
Engage an AS1 licensed contractor to manage asbestos impacted fill in accordance with Work Cover NSW (2008).		✓	
Provide a secure, lockable and floored area for the storage of fuel, oil or chemicals. This area would be imperviously bunded with a capacity to contain not less than 110% of the volume of the largest container.		✓	✓
Prior to construction, nominate and sign post a plant refueling area.		✓	
Comply with NS 156 when working near or around underground cables.		✓	✓
Stockpile soils from above the slab of existing 132kV cable trenches in a plastic lined and covered secure bin.		✓	✓
Manage soil from below the slab of existing 132kV cable trenches in the following manner: • keep them separate from soils from above the slab, • any person handling the waste is trained in handling scheduled chemicals and methods of containing scheduled chemical spills and wear personal protective equipment (PPE), and • all packages / storage containers must be clearly labelled and maintained in good order.		✓	✓
If the soil is not contaminated with cable fluid (or anything other than OCP) it can be replaced in the trench to its original depths. Soil excavated from below the protective slab must be reinstated below the protective slab.		✓	✓
Where the soil contains contaminants such as cable fluid, the fill material should be disposed off-site to a suitably licensed waste facility. The waste must be classified in accordance with the NSW EPA Waste Classification Guidelines. The sampling must include OCPs.		✓	✓

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
When transporting soil where the concentration of Aldrin or Dieldrin in the soil is 5-mg/kg or greater, or the presence has not been ruled out, the following additional controls apply: The transport vehicle must carry personnel trained in containing spills of OCP contaminated spoil. Appropriate PPE, clean up material and equipment must be carried on the transport vehicle.		✓	✓
If soils from below the slab of existing 132kV cable trenches is contaminated with substances other than OCP: • do not reinstate the soil in the trench and assume the soil is hazardous waste until it is classified, • wear appropriate PPE, • transport using a licensed transporter to a premises licensed to store the contaminated soil, and • arrange for classification of the soil. dispose of the soil offsite in accordance with the classification		✓	✓
If asbestos is encountered in soil or old conduits or joint bays during construction, the works would cease, access restricted and the asbestos managed and disposed of in accordance with NS 211 Working with Asbestos Products and NSW EPA's Waste Classification Guidelines.		✓	✓

5.8.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to contamination for reasons including:

- there is no known contamination on the site,
- the contamination would be managed in accordance with relevant OEH contamination guidelines, and
- mitigation measures outlined in section 5.8.3 would readily manage potential impacts.

5.9 Waste

5.9.1 Existing environment

The proposed construction site component of the substation is currently unoccupied and as such there is no waste being generated.

The existing substation is unmanned and only generates small amounts of waste such as oil absorbent pads, green waste, general waste and light globes which are generally taken to Ausgrid's Homebush depot for recycling or disposal.

5.9.2 Potential impacts

The proposal may generate various types of waste, some would be reused or recycled while others would require disposal. Most waste would be generated during the construction phase. Waste likely to require disposal includes:

- excavated earth material that is unsuitable for re-use,
- waste oils, liquids and fuels from maintenance of construction plant and equipment,
- wastes from site compounds (including sewage waste, putrescible waste etc),
- building waste (packaging material, scrap metal, plastic wrapping, cardboard),
- excess building materials that can't be reused,
- vegetation from clearing activities,
- cable and conduit off-cuts,
- timber cable drums,
- timber pallets, and
- other general construction waste.

All waste would be re-used where possible, otherwise managed in accordance with the NSW EPA *Waste Classification Guidelines*.

Pre-classification in-situ has been undertaken for the cable basement. Based on the laboratory results for the soil samples analysed the surplus soil materials are assessed to have an interim waste classification as general solid waste. Waste classification would be undertaken during the works.

Any soil identified as virgin excavated natural material (VENM) or excavated natural material (ENM) would be reused where possible. Any excess soil would be disposed of at an appropriately licensed facility or recycled through an appropriately licensed soil recycler.

Any soil suspected of being contaminated would be stored and sampled separately then disposed to an appropriately licensed waste facility (refer to section 5.9.3). This is likely to apply to excavated material from transformer bays.

The existing switchgear will ultimately be decommissioned and disposed as they have reached the end of their serviceable life. Materials can be recycled at end of life upon the removal of all known hazardous materials. This will be undertaken be specialist contractors prior to scrapping as part of our NS174c processes.

During the operation of the proposal, waste generation would be minimal.

5.9.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-11.

Table 5-11: Waste mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	**Construction**	**Operation**
Comply with sections 3.3 Polychlorinated biphenyls and 5.3 Waste management of NS174C Environmental Handbook.		✓	
All workers are to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
Classify wastes to determine licensing, waste tracking and disposal requirements.		✓	
Segregate and label waste to improve recycling opportunities, avoid cross contamination and reduce disposal costs.		✓	
Reuse VENM and ENM where options are available. Ensure that: • a valid waste classification certificate is available and • the reuse meets the conditions of the planning approval for that site.		✓	
Where more than 50kg but less than 1 tonne of Scheduled Chemical Waste (SCW) is stored, ensure that: • there is a clearly defined storage area with conspicuous warning notices • the storage area is constructed to prevent discharge into the external environment. This can be satisfied by storing in a plastic lined and covered bin • an adequate supply of PPE, clean-up material and equipment must be available in a secure external location from the storage area.		✓	
Where more than 1 tonne of SCW is stored: • a licence is required to store the waste. • comply with the conditions of the licence • perform monthly inspections for unauthorised entry or leakage and keep a log at the storage area containing details and reports of inspections.		✓	
When transporting SCW with a concentration of more than 50mg/kg, personnel accompanying the vehicle must: • be trained in methods of containing spilled scheduled chemicals • be provided with adequate personal protective equipment, clean up material and equipment to deal with any spill • notify the EPA of any spill.		✓	

5.9.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to waste for reasons including:

- all waste would be re-used or managed in accordance with the NSW Waste Classification Guidelines.
- mitigation measures outlined in section 5.9.3 would readily manage potential impacts.

5.10 Flora and fauna

5.10.1 Existing environment

The existing flora and fauna environment of the proposed site consists of cleared land.

Immediately to the sites north there is a discontinuous row of casuarinas established along the top of the embankment for the length of the proposed construction accessway. This row of vegetation is not mapped in recent DPIE mapping (2020) nor on the Biodiversity Values mapping (2020). Natural habitat for the occurrence of swamp oak is not present at the subject site.

An assessment of the existing flora and fauna environment was undertaken by consultants ACS Environmental (Appendix F). The report indicated that this row of casuarinas was likely planted as a screen between neighbours. Historical photographs indicate tightly planted hedgerows planted in a south north orientation. The access track was cleared at the time, infilling is unclear.

Weeds observed immediately south of the site include two Hackberry's. Up to 8m in height these deciduous trees may provide amenity value to the neighbours.

5.10.2 Potential impacts

The proposal requires the removal of most, if not all casuarinas along the proposed construction accessway to enable the passage of large plant, equipment and vehicles as well as to facilitate the installation of several banks of 11kV cables and stormwater back out to George St.

Two Hackberry's along the site's southern boundary were assessed by an arborist and may be heavily pruned to facilitate construction whilst protecting the amenity of the neighbouring residence if need be. Equally, if suitably justified by the civil contractor that they cannot be retained, removal is permitted in consultation with Ausgrid.

Casuarinas

A specialist ecological assessment was undertaken for the proposal (Appendix F). The report concluded the ecological plant community occurring at the subject site which is proposed to be removed to facilitate the construction of a suitable access path for heavy vehicular traffic is a distribution of planted Swamp Oak (Casuarina glauca). This vegetation type is not indicative of a natural distribution of Swamp Oak and considered as "Urban Natives and Exotics' in relation to mapping by OEH (2016). The distribution of Swamp Oak does not occur within the range of natural habitat for this species.

Individuals may be trimmed or removed to facilitate construction are not threatened species, have been planted in unnatural habitats, and their removal or modification is not considered significant.

Habitat is unsuitable for the potential presence of 13 threatened plant species recorded for an area of 10km centred around the subject site. No threatened species of plants were observed at the site.

As such, the requirements under the State BC Act (2016) and Commonwealth EPBC Act (1999) have been addressed and no further action is considered necessary in relation to the proposal.

Hackberry

A specialist arborist assessment was undertaken for the proposal (Appendix F). The tree currently provides some level of amenity through screening between the properties, however, the tree is deciduous, so this screening is probably far more beneficial through the summer months. The tree was displaying fair health and vigour with evidence of sap sucking insect infestation and sooty mould on some of the lower foliage.

Excavation: If the structure is to be located closer than 2.9m from the fence, non-destructive excavation will be required to determine the level of impacts which would be likely.

Pruning: To facilitate construction, pruning most of the branches overhanging the fence line is proposed. This is unlikely to impose significant impact upon the tree, however, it may result in an unappealing appearance. To counter this it appears possible that the majority of the lower branches could be pruned whilst some of the upper branches could be tied back until the construction has been completed. Refer to the figure in Appendix F.

Weeds

The spread of weeds through the study area may occur regardless of which site is chosen for the proposal.

The most likely causes of weed dispersal associated with the proposal would include earthworks, movement of soil and attachment of seed (and other propagules) to vehicles and machinery.

5.10.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-12.

Table 5-12: Flora and fauna mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 6 Ecology of NS174C Environmental Handbook.		✓	
Vegetation to be retained must be identified and protected to prevent damage from workers and machinery and remain in place for the duration of construction work.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with the Tree Safety Management Plan when undertaking vegetation pruning/ removal and maintenance works.		✓	✓
Vegetation clearing and pruning to comply with NEG-OH21 Vegetation Safety Clearances / ISSC3 Guideline for Managing Vegetation Near Powerlines/Bushfire Risk Management Plan.		✓	✓
Where works could inadvertently harm adjacent vegetation, implement measures to protect the TPZ and the vegetation.		✓	
Trench or excavate outside the SRZ unless in accordance with arborist advice.		✓	
Contain and dispose of cleared vegetation containing weeds to an appropriately licensed vegetation waste disposal facility.		✓	✓
Prior to construction, mark and fence off tree protection zones (TPZ).		✓	
Contact local wildlife rescue organisations for the rescue or care of native wildlife (refer to section 11 of NS174C Environmental Handbook)		✓	✓
Clear the minimum amount of vegetation necessary and consider replacement planting.		✓	
Use locally native species for landscaping.		✓	
No importing mulch from other sites.		✓	✓
Provide an escape route for fauna if trenches or pits will be open extended periods (eg log or stick)		✓	
Keep storage areas, stockpiles, vehicle parking, and access tracks clear of the TPZ.	✓	✓	

5.10.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to flora and fauna for reasons including:

- the site / route is located within existing cleared areas which would minimise the number of trees requiring removal and disruption of habitat,
- Ecological assessment conclude that the proposal is unlikely to significantly impact upon any local population of threatened species or any endangered population, ecological community or their habitats and the preparation of a species impact assessment is not required,
- Arborist assessment concluded that heavy pruning of those two identified Chinese/ Japanese Hackberry's would not affect their structural integrity and can therefore be retained,
- no significant impact to any matters of NES is expected (refer to Table 6-2) and a referral to the Commonwealth Department of Environment is not required, and
- mitigation measures outlined in section 5.10.3 would readily manage potential impacts.

5.11 Bush fire

5.11.1 Existing environment

The proposal is not within land mapped as a bush fire category under NSW RFS bush fire prone land maps.

The site is in an urban setting surrounded by cleared land.

5.11.2 Potential impacts

The risk of causing a bush fire is primarily associated with construction and maintenance activities, not the inherent nature of the proposed infrastructure. The main risks constitute:

- undertaking various kinds of 'hot work' where naked flames are used, such as welding, use of blowtorches, angle-grinding and use of gas torches for shrinking heat shrink components, and
- use of machinery with the potential to generate sparks, such as jack hammers, rock saws, and angle grinders.

Ausgrid's guideline DG 33 Hot Work During Total Fire Bans restricts hot works during total fire bans and require risk assessments and precautions to be put in place to minimise the risk of causing a bush fire. These precautions would apply to construction and maintenance for the life of the proposal.

Ausgrid's design and performance standards require the application of passive fire protection to its substation which in some instances is over and above the minimum requirements of relevant statutory regulations given the unique risks of substations. Passive fire mitigation design involves the application of a fire rating to fire barrier/fire separation walls, the provision of adequate separation distances or a combination thereof.

In accordance with the *Building Code of Australia* (BCA) requirements, active fire protection systems would be incorporated into the building where required. Active fire extinguishing systems such as sprinklers and deluge systems aim at reducing the damage to burning equipment by reducing or eliminating any fire or smoke damage to the substation and equipment.

This requirement has been integrated into the proposed design and assessed during the design stages of the proposal. The result of this design process is a development which exceeds the minimum requirements of relevant statutory regulations.

5.11.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-13.

Table 5-13: Bush fire mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 6.4 Total fire bans of NS174C Environmental Handbook.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
All workers to be made aware of sensitive areas and the need to avoid impacts.		✓	
Design the substation to address both passive and active fire protection systems, including: • specification of fire ratings in the building design, • application of active fire protection controls as required by the BCA, and • provision for access and emergency egress in accordance with the relevant statutory regulations,	✓		
Design the control building with a masonry construction and no external windows or timber, including on the northern or hazardous side of the building. The building would normally be unoccupied, except for occasional maintenance visits, and it would be unlikely that there would be any occupants of the building during a bush fire event. If there were occupants however, it would be likely that the building would provide protection from radiant heat during the passage of the fire front.	✓		
During a total fire ban, no open fires or hot works are to be undertaken unless in accordance with an exemption granted by the NSW RFS.		✓	✓
Any hot works during a total fire ban must be in accordance with an approved exemption Ausgrid employees to work in accordance with DG33. This includes grinding, welding, brazing, oxy-cutting, heat treatment or processes that generate heat or continuous streams of sparks. The Contractor or ASP must obtain their own exemption.		✓	✓
Hot work activities to be clear of combustible matter by at least 3 metres. Keep adequate fire fighting equipment immediately at hand. Avoid driving a vehicle through long grass or operating motors and equipment in proximity to vegetation.		✓	✓
Undertake consultation with the local fire authority prior to commencing hot works to advise of works in bushfire prone areas and of any access restrictions to fire trails.	✓		
Schedule hot works activities during the more favourable period of the day and week.		✓	

5.11.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to bush fire risk for reasons including:

- the proposal is not located within bush fire prone land
- during a total fire ban, no open fires or hot works would be undertaken unless in accordance with an exemption granted by the NSW RFS

- mitigation measures outlined in section 5.11.3 would readily manage potential impacts.

5.12 Aboriginal heritage

5.12.1 Existing environment

The proposal is located in an area administered by the Metropolitan Local Aboriginal Land Council (LALC).

The study area is developed land that has previously been disturbed. Previous disturbance has occurred over the whole area as a result of historical infilling, construction of historical rural infrastructure, construction of roads, trails and tracks, construction of buildings or structures, installation of utilities, clearing of vegetation, substantial grazing, earthworks and modification of the ground surface is clear and observable.

With regard to landscape features, the study area is not located within 200 m of waters, within a sand dune system, on a ridge top, ridge line or headland; within 200 m below or above a cliff face; or within 20 m of or in a cave, rock shelter, or a cave mouth. In addition, there are no old growth trees in the vicinity of the site.

A desktop assessment of OEH's Aboriginal Heritage Information Management System (AHIMS) and the Commonwealth Department of Environment Protected Matters Search Tool revealed no Aboriginal sites/objects have previously been recorded in proximity to the proposal site.

5.12.2 Potential impacts

The proposal would not impact on any known Aboriginal object. The proposal does not involve clearing native vegetation or disturbing the ground surface in areas previously undisturbed. There are no landscape features that indicate the presence of Aboriginal objects.

The location of registered artefacts is generally isolated to areas of potential developments and hence the result of investigations for development or rezoning applications. The presence of registered artefacts does not indicate the significance of sites in regional context, nor reflect the absence of artefacts in other locations. The mapping of registered sites is often misleading and infers the absence of artefacts in other areas, when in fact it reflects an absence of detailed investigations.

Therefore consideration of the potential for Aboriginal objects to be in the area of the proposal is required regardless of whether the database searches indicate known Aboriginal objects. Aboriginal objects are often associated with particular landscape features as a result of Aboriginal people's use of those features in their everyday lives and for traditional cultural activities. The proposal is not located near landscape features such as are rock shelters, sand dunes, waterways, waterholes, old growth trees and wetlands.

Notwithstanding, if potential heritage is identified during works, the works would cease, access restricted and the Environmental Officer contacted to investigate.

Given the proposal would not impact on any known Aboriginal sites, is not located on undisturbed land, does not comprise any sensitive landscape features and visual inspection did not reveal any new objects, the probability of objects occurring in the

area of the proposed activity is low and it was concluded that a more detailed investigation (and an AHIP application) and consultation with the Metropolitan Local Aboriginal Land Council (LALC) was not required.

5.12.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-14.

Table 5-14: Aboriginal heritage mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 7.1 Aboriginal heritage of NS174C Environmental Handbook.		✓	

5.12.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to Aboriginal heritage for reasons including:

- the proposal would not impact any known Aboriginal sites, is not located on undisturbed land, does not comprise any sensitive landscape features and a visual inspection did not reveal any new objects,
- there are no known Aboriginal objects on the site,
- the proposal would not impact any known Aboriginal sites, and
- mitigation measures outlined in section 5.12.3 would readily manage potential impacts.

5.13 Non-Aboriginal heritage

5.13.1 Existing environment

A desktop assessment was conducted using the Australian Heritage Database[19], NSW State Heritage Inventory[20] and the City of Canada Bay Local Environmental Plan. The results of these searches were that there are no Commonwealth or State items, but several Local Heritage listed items in the study area. Figure 5-3 provides for the location of heritage items within the study area.

Table 5-15: Non-Aboriginal Heritage items

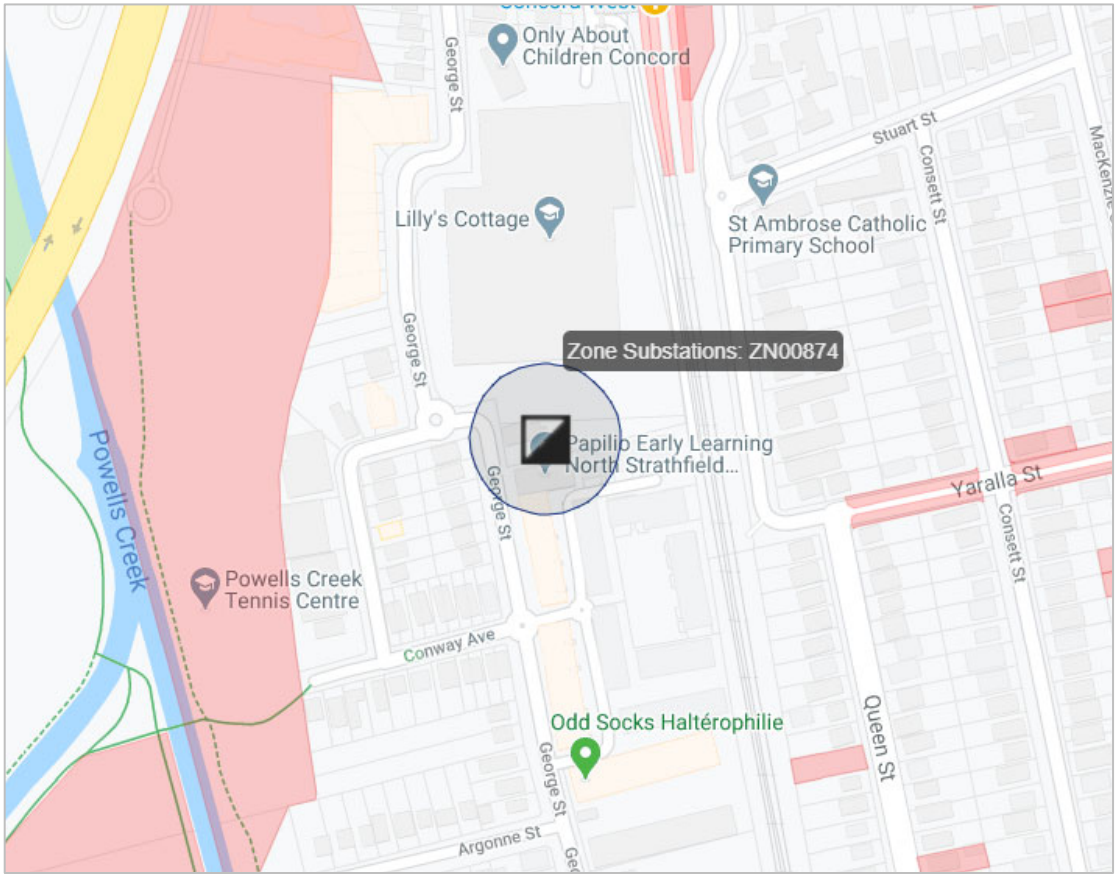

Figure 5-3: Location of heritage items within the study area.

5.13.2 Potential impacts

The proposal is located generally within an existing site and has been previously disturbed. Due to the previous disturbance and the proposal's location away from existing buildings and existing listed items (Figure 5-3), it is not expected that non-Aboriginal heritage would be found or impacted during construction.

There is no information to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed.

5.13.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-16.

Table 5-16: Non-Aboriginal heritage mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 7.2 Non-Aboriginal heritage of NS174C Environmental Handbook.		✓	
All workers to be made aware of sensitive areas and the need to avoid impacts.		✓	

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
All works to cease if potential heritage is discovered. Access should be restricted and Supervisor notified to ensure Heritage Council is contacted. Ausgrid employees should contact Ausgrid Environmental Services on 9394 6659.		✓	

5.13.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to non-Aboriginal heritage for reasons including:

- there are no known non-Aboriginal items on the site,
- the proposal would not affect known non-Aboriginal heritage items, and
- mitigation measures outlined in section 5.13.3 would readily manage potential impacts.

5.14 Visual and aesthetics

5.14.1 Existing environment

The existing visual environment of the proposed site consists of:

- relatively flat terrain with little contrast, ruggedness or ridgelines,
- high level of existing development in area (spread out residential homes and medium to high density apartments) bordering a light industrial/ commercial area,
- existing infrastructure in the area including Ausgrid's substation, a telecommunications tower and the railway, and
- no prominent vantage points.

Figure 5-4 shows the proposed site and existing visual environment. The photographs show land use adjacent to the proposal.

Figure 5-4: Existing visual environment Concord Zone substation.

5.14.2 Potential impacts

Potential visual impact may be determined through visual sensitivity of the site and the magnitude of changes. The site has a low visual sensitivity. Visual modifications as a result of the proposal would include:

- erection of a switchroom building with a maximum building height of less than 7m,
- vegetation clearing to facilitate construction access,
- light spillage onto surrounding properties,
- security perimeter fencing, and
- short term construction activities.

The proposal would be visible from:

- residents and road users on George Street,
- residents at the adjoining property immediately south on George Street,
- Commuters on the rail network, and
- The commercial premises to the sites immediate north.

Short term visual impact

The construction phase of the proposal would have a visual impact on local views due to the presence of plant and equipment, exposed soil and removal of trees. The impact would vary throughout construction, with the earthworks stage likely to be most visually prominent. As construction impacts would be short term and the adjoining stakeholders would be consulted about the works, the overall impact during construction is not expected to be significant. Disturbed areas would be reinstated as soon as practicable to further ameliorate short term visual impact.

Long term visual impact

Ausgrid's approach has been to, together with architectural specialists, Kann Finch prepare two concept designs of the proposed building to facilitate consultation with the adjoining property immediately south on George Street. Figure 5-5, Figure 5-6 and Figure 5-7 are artistic impressions of the preferred concept design.

Given the proposed location is immediately to the north of residential apartment buildings, shadow diagrams were produced for the proposal. It was confirmed there would be minimal impact on a few apartments at the ground floor during the winter solstice with no impact on the majority of apartments. Refer to Appendix A for shadow diagrams.

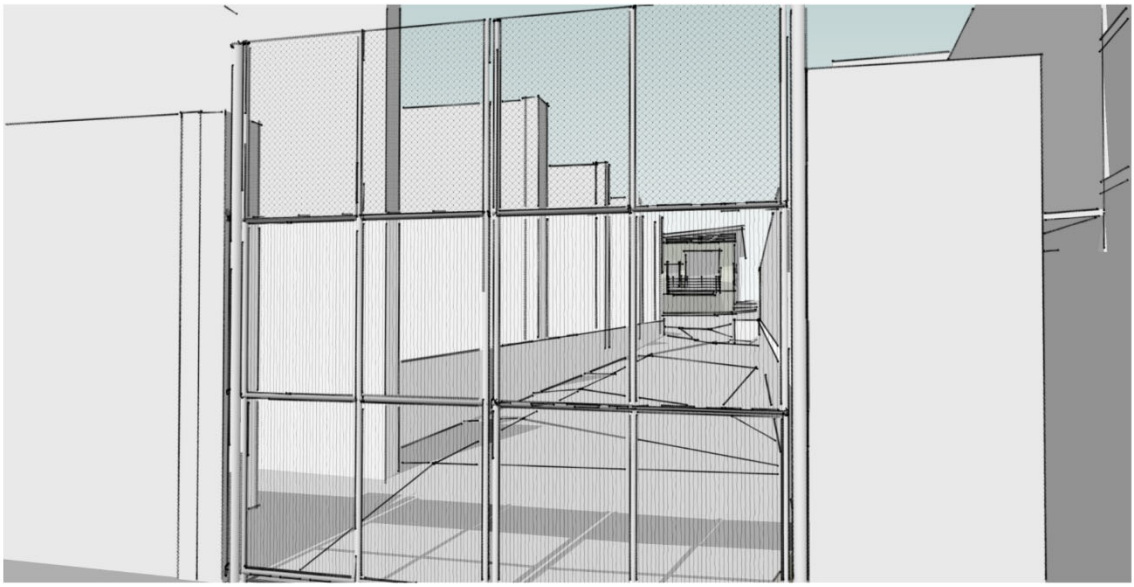

Figure 5-5: Artistic impression of the preferred concept design viewed from George Street substation entrance (including colour palette).

Figure 5-6: Artistic impression of the preferred concept design viewed eastern end of the existing transformer roadway (including colour palette).

Figure 5-7: Artistic impression of the preferred concept design viewed from the southern apartments (including colour palette).

Long term visual impact on local views would occur residents at the adjoining property immediately south on George Street.

The impact would be limited due to:

- the southern building walls façade treatment,
- vegetation to be retained (where possible),
- decorative perimeter fencing,
- building offsets to the north and,
- a gently sloping flat roof.

Limited numbers of people would be exposed to this visual impact.

Building form, character and position was designed to limit visual impact for the surrounding community within the given site and engineering constraints present.

A selection of colours and materials sympathetic to the location would provide a positive visual treatment. It is not considered that these works would not result in any transformation of the locality.

Once constructed, the proposal would not restrict access to recreational space, commercial or industrial development, residential development or water supply catchment. The proposal would require minimal maintenance, reducing the need for plant and equipment to access the site. Maintenance work would form part of Ausgrid's existing maintenance program.

5.14.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-17.

Table 5-17: Visual mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Consult with affected stakeholders about the proposal.	✓	✓	
Reinstate the roadways post works to a suitable condition.		✓	
Construct an indoor switchroom with a contemporary design in keeping with the locality	✓		
Install the preferred façade treatment along the southern building wall	✓	✓	

5.14.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to visual and aesthetic value for reasons including:

- the proposal would be located within the existing property that contains existing electrical infrastructure,
- electrical cabling within the site would be placed underground and minimise visual impact on the surrounding area,
- the building is architect designed with appropriate profile, colours, façade treatments and materials to suit the area, and
- mitigation measures outlined in section 5.14.3 would readily manage potential impacts.

5.15 Traffic and access

5.15.1 Existing environment

The proposal would generally be within an Ausgrid property that would be accessed from George St. There are no NSW Roads and Maritime Service Classified roads within the study area.

The existing Concord zone substation would be used as a staging area. Whilst the construction access way to the sites immediate north would be developed to provide for safe movement of vehicles and equipment off the road.

The main features of the transport network in the area of the proposal include the public rail line to the sites east and Homebush Bay Drive at the west bordering Sydney Olympic Parks eastern most perimeter. Businesses and the general community in the region is heavily reliant on the road network for private vehicle usage and public transport in the form of buses, commercial vehicles and public trains.

Traffic on George Street can be heavy during peak times as it services both local businesses and residents. Its catchment to the north terminates at Concord Ave, approximately 450m past Concord zone substation. George Street does not provide a thoroughfare to traffic.

Concord zone substation is located on the outer perimeter of a sharp 90-degree turn meeting a roundabout immediately after. The roundabout forms a junction with Rothwell Avenue and George Street.

Both sides of George Street are heavily utilised for car parking during business hours and for residents out of hours. There is a paved footpath on the substation (eastern) side of George Street.

5.15.2 Potential impacts

During construction many vehicles would be required at the site at any one time. Vehicles associated with the proposal would mainly include light vehicles and one to two heavier vehicles such as truck mounted pile driver and cranes. Heavy vehicles at the site are expected to cause some minor disruption to local roads. Construction would also result in temporary changes to traffic arrangements in local roads. Portions of some roads would need to be blocked and access may change or be reduced to some buildings for short periods of time.

During construction, access to the proposed site would be from George Street via a easement/ right of way to the sites immediate north. Protection measures such as cattle grates or sections of blue metal would be placed at the entrance to reduce the potential for tracking onto the roadway.

The easement resides at the top of a battered slope consisting of unconsolidated fill materials. Given the narrow nature of the easement and its location, significant road building and retaining work would be required prior to the commencement of the building works. These ancillary works have been suitably designed by a civil engineer, measures will be put in place to prevent erosion and sedimentation into the neighbouring carpark. The consent of the landowner has also been obtained.

Where major road disruption will occur, a traffic management plan (TMP) would be prepared in accordance with the RMS Manual *Traffic Control at Work Sites*[21] and would be implemented during construction. The TMP would also include allocated areas for staff parking.

A traffic control plan (TCP) that shows the traffic control arrangements for the proposed site would be prepared in accordance with Australian Standard 1742.3. The TCP consists of a diagram showing temporary signs and devices arranged to warn traffic and guide it around, past or if necessary through the proposed site.

During operation, the site would only be visited by vehicles on an intermittent basis for general maintenance purposes.

Measures would be employed to minimise traffic disruption. The construction would be undertaken by those experienced in such activities along traffic routes. Any disruption, however, cannot be fully avoided, but can be minimised through timing the work to avoid peak traffic flows.

There would be some localised disruption to the community around the immediate work site (delivery of construction equipment and materials) in terms of a reduction in pedestrian access and disruption to vehicular traffic and parking during construction works. Any inconvenience to pedestrians during construction or maintenance would be minimised by ensuring that there is an alternative route. Additionally, residents, public authorities and commercial organisations would be notified via a letterbox drop of upcoming works.

5.15.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-18.

Table 5-18: Traffic and access mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 4.2 Noise and vibration of NS174C Environmental Handbook.		✓	
Prepare and implement a Traffic Management Plan in accordance with [RMS/Council requirements and/or approval conditions, including pedestrian and cycle ways].		✓	
Prior to construction, prepare a TCP in accordance with the Australian Standard 1742.3		✓	
The TMP and /or TCP must consider the cumulative impact of construction traffic movements from other Ausgrid and non-Ausgrid works.		✓	
During the construction and utilisation of the northern accessway, measures will be put in place to prevent erosion and sedimentation into the neighbouring carpark.		✓	
All potentially affected residents and businesses are to be provided with 48 hours notice of any access changes to properties. Where residents and businesses are directly affected by the work (e.g. their access will be restricted), one week's notice must be given.		✓	
Reinstate roads post works in consultation with council/RMS.		✓	

5.15.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to traffic and access for reasons including:

- the construction period is temporary, localised and short term,
- all works affecting George Street would be undertaken in accordance with a TMP or TCP,
- given the small number of vehicles expected to be used during construction, it is unlikely to result in increased traffic in the area,
- once in operation, the proposal would have minimal impact on the local traffic, and
- mitigation measures outlined in section 5.15.3 would readily manage potential impact.

5.16 Social and economic

5.16.1 Existing environment

The proposal is located within the suburb of Concord within the City of Canada Bay LGA. Land use within the area is characterised by a mix of high and low density residential, business and a rail transport corridor.

There are a number of commercial/ industrial facilities adjacent to the proposed site.

5.16.2 Potential impact

The proposal would increase the reliability of electrical supply, resulting in a positive impact on the community.

By reducing the probability of power shortages and failure, the proposal is reducing the associated economic risks, including damages and productivity losses resulting from short term interruption of commercial activities.

Construction projects such as this proposal create opportunities for suppliers, contractors and consultants which creates flow on benefits for local communities. Discretionary spending by civil contractors during the construction period would benefit the local region.

Short term impacts on the community during the construction phase of the proposal include increased traffic intensity, altered traffic conditions, maintaining access to properties and noise. Security issues have been a major consideration throughout the design phase of the proposal. The substation would be maintained and operated in a safe manner at all times. This would include the provision of high security fencing and signage as outlined in section 1.6.5.

During the consultative process, as detailed in section 2, the community expressed concern over the social consequences resulting from the selection of the site within their community. Refer to section 2 for how these impacts have been addressed.

Due to the small scale of the works, the socio-economic impacts of the proposal would be localised.

As a result:

- the development is unlikely to result in any reduction in the range of beneficial uses of the environment,
- the development is unlikely to result in any increased demands on resources that are likely to be in short supply, and
- the development is unlikely to reduce the recreational value of the locality.

5.16.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-19.

Table 5-19: Social and economic mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
EMF, noise, visual and traffic mitigation measures (sections 5.3.3, 5.4.3, 5.14.3 and 5.15.3 would reduce potential impacts on the surrounding community).	✓	✓	✓

5.16.4 Conclusion

The proposal is not likely to significantly affect the environment in relation to social or economic impacts for reasons including:

- construction related impacts would be minor, localised and short-term,
- once in operation, the small scale of the works means any the socio-economic impacts of the proposal would be localised,
- a more reliable electricity supply reduces associated economic risks such as damages and productivity losses resulting from short term interruption of commercial activities, and
- mitigation measures outlined in section 5.16.3 would readily manage potential impacts.

5.17 Cumulative impact

5.17.1 Existing environment

Cumulative impacts may be experienced due to the interaction of elements within the proposal, or with other existing or proposed developments within the locality. Where possible, the cumulative impact associated with the proposal has been incorporated into the assessments within this REF.

Ausgrid projects typically have related projects and flow on activities due to the interconnected nature of the network. There are no other Ausgrid activities with potentially cumulative impacts.

Ausgrid is not aware of any third-party activities within the immediate area that may lead to potentially cumulative impacts.

5.17.2 Potential impact

The potential impact due to the interaction of elements within the proposal, or with other existing or proposed developments within the locality is summarised in Table 5-20.

Table 5-20: Summary of cumulative impacts

Potential impact	Other activities with cumulative impacts	Contribution to overall impact	REF section
Noise	Construction and operational (reflective) noise as identified in section 5.4.2. .	The specialist noise assessment considered the cumulative impact of the construction and operation of the substation. Council was consulted in relation to other development in the area. Council did not make a submission (see section 2.2). Noise impacts during the construction phase would be localised, short term and staged along the separate sections of the proposal.	5.4
EMF	Existing 33 kV, 11 kV and 415 V power lines. Existing 33 kV, 11 kV substations.	The specialist EMF assessment considered the cumulative impact of the operation of the substation. Council was consulted in relation to other development in the area. Council did not make a submission (see section 2.2).	5.3
Traffic	Traffic from construction activities listed in section 5.15.2	Council was consulted in relation to other development in the area. Council submissions have been given due consideration (see section 2). The TMP and / or TCP would consider the cumulative impact of construction traffic movements.	5.15
Flora and fauna	Flora and fauna impacts from construction activities listed in section 5.10.2.	The specialist flora and fauna assessment considered the cumulative impact of the construction and operation of the substation. Council was consulted in relation to other development in the area. Council submissions have been given due consideration (see section 2).	5.10
Visual	Visual impacts as a result of the new building component is listed in section 5.14	Council was consulted in relation to other development in the area. Council did not make a submission (see section 2). Activities listed in section 5.14.2 would not materially alter the outcome of the visual assessment in 5.14.2.	5.14

Potential impact	Other activities with cumulative impacts	Contribution to overall impact	REF section
Resources	Materials as listed in section 1.7.9 are required for the proposal.	These materials are not currently in short supply, and it is not anticipated that the proposal would substantially increase the demand on these resources. The proposal would not have a major impact on the demand on resources.	5.9

5.17.3 Conclusion

The proposal is not likely to have significant cumulative impacts for reasons including:

- the localised extent of potential impacts during construction and operational phases

6 Consideration of environmental factors

6.1 Clause 228 factors

In accordance with clause 228 of the EP&A Regulations, the following factors were considered for the proposal.

Table 6-1: Consideration of clause 228 factors

Clause 228 factors	REF section giving consideration to the factors
Impact on a community	2 Consultation, 5.1 Land use, 5.3 Electric and magnetic fields, 5.4 Noise and vibration, 5.14 Visual and aesthetics, 5.15 Traffic and access and 5.16 Social and economic
Transformation of a locality	5 Environmental assessment
Impact on the ecosystem of the locality	5.10 Flora and fauna, 5.11 Bush fire and 6.3.3 Biodiversity
Reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality	5 Environmental assessment
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	5 Environmental assessment
Impact on the habitat of protected fauna	5.10 Flora and fauna
Endangering any species of animal, plant or other form of life, whether living on land, in water or in the air	5.10 Flora and fauna
Long-term effects on the environment	5 Environmental assessment
Degradation of the quality of the environment	5.7 Geology and soil
Risk to the safety of the environment	5.8 Contamination and 6.3.1 Precautionary principle

Clause 228 factors	REF section giving consideration to the factors
Reduction in the range of beneficial uses of the environment	5.1 Land use
Pollution of the environment	5.6 Hydrology and 5.8 Contamination
Environmental problems associated with the disposal of waste	5.9 Waste
Increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	1.7.9 Resources and equipment and 6.3.4 Improved valuation of resources
Cumulative environmental effect with other existing or likely future activities	5.17 Cumulative impact
Impact on coastal processes and coastal hazards, including those under projected climate change conditions	5.2 Climate Change

6.2 Matters of national environmental significance

In accordance with the EPBC Act, the following matters of NES were considered for the proposal[22].

Table 6-2: Consideration of Matters of NES

Matters of NES	Comment	Likely impact
World Heritage Properties	No world heritage properties would be potentially affected by the proposal	Nil
National Heritage Places	No national heritage places would be potentially affected by the proposal	Nil
Wetlands of International Importance	No wetlands of international importance would be potentially affected by the proposal	Nil
Commonwealth listed Threatened Species and Ecological Communities	No threatened species, populations or ecological communities listed within Commonwealth (or State) legislation would be potentially affected by the proposal	Nil
Commonwealth listed Migratory Species	No migratory species would be potentially affected by the proposal	Nil
Nuclear Action	The proposal would not result in any nuclear action nor would it require any nuclear action to be undertaken.	Nil
Commonwealth Marine Areas	No Commonwealth marine areas would be potentially affected by the proposal	Nil
Great Barrier Reef Marine Park	The Great Barrier Reef Marine Park would not be affected by the proposal as it is not located within Ausgrid's network area.	Nil
Water resources in relation to coal seam gas development and large coal mining development	Water resources would not be affected by the proposal as it does not involve coal seam gas or coal mining development.	Nil

6.3 Ecologically sustainable development

The proposal has been assessed against the following four principles of ESD as listed in the *Protection of the Environment Administration Act 1991* (NSW) adopted by s. 1.3(b) of the EP&A Act.

6.3.1 Precautionary principle

The precautionary principles (s. 6 (2) (a)) states that:

'If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation'.

For the precautionary principle to be applicable two pre-conditions must be satisfied; "first it is not necessary that serious or irreversible environmental damage has actually occurred – it is the threat of such damage that is required. Secondly, the environmental damage threatened must attain the threshold of being serious or irreversible".[23]

When the precautionary principle applies, measures taken must be proportionate to the level of threat. In assessing the level of threat and determining a proportional response, Ausgrid is guided by the relevant regulators and health authorities who are charged with the responsibility for providing such advice.

Potential health effects associated with EMF are discussion in section 5.3.

A specialist environmental investigation has been undertaken during the preparation of this REF to ensure that the potential environmental impacts are understood with a degree of certainty. The design for the proposal has evolved to avoid environmental impacts where practical and mitigation measures have been recommended to minimise adverse impacts.

The proposal is therefore considered to be consistent with the precautionary principle.

6.3.2 Inter-generational equity

The principle of inter-generational equity (s. 6 (2) (b)) states that:

'The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.'

The key objective of the proposal is to improve electricity supply and reliability, catering for future demand for the benefit of future generations. The proposal would not result in any impacts that are likely to impact on the health, diversity or productivity of the environment for future generations.

Potential health effects associated with EMF are discussed in section 5.3. Mitigation of potential for contamination from Ausgrid assets are discussed in section 5.3.3.

The proposal is considered to be consistent with the principle of inter-generational equity.

6.3.3 Biodiversity

The principle of biological diversity and ecological integrity (s. 6 (2) (c)) states that:

'Conservation of biological diversity and ecological integrity should be a fundamental consideration.'

A flora and fauna assessment was undertaken to give due consideration to the proposal's potential impact on the biological diversity and ecological integrity of the study area.

The proposal is considered to be consistent with the principle of biological diversity.

6.3.4 Improved valuation of resources

The principle of improved valuation of environmental resources (s. 6 (2) (d)) states that:

'Environmental factors should be included in the valuation of assets and services.'

This principle explains that those who generate pollution and waste should bear the cost of containment, avoidance and abatement; the users of goods and services should pay prices based on the full life cycle of costs; and environmental goals should be pursued in the most cost effective way.

All costs associated with the containment, avoidance and abatement of pollution have been factored into the design of this proposal and Ausgrid's operations generally.

The proposal is considered to be consistent with the principle of improved valuation of environmental resources.

7 Summary of impacts

A number of potential environmental impacts from the proposal have been avoided or reduced during the design development and options assessment. The proposal as described in this REF best meets the project objectives but would still result in some impacts on visual and amenity and short term construction impacts in relation to noise for neighbouring residents.

Mitigation measures as detailed in this REF would avoid or minimise these expected impacts. On balance the proposal is considered justified.

On this basis, it is concluded that the proposal and adopted mitigation measures will result in an overall minor environmental impact.

8 Environmental management plan

8.1 Construction environmental management plan

A construction environmental management plan (CEMP) outlines the environmental objectives of a proposal, the environmental construction mitigation measures to be implemented, the timing of implementation, responsibilities for implementation and management, and a review process to determine the effectiveness of the strategies.

Once the construction methodology is known, the principal construction contractor would be responsible for developing a CEMP that addresses the scope of works to be undertaken, including site specific, measurable and achievable actions to the CEMP and the preparation of any appropriate work methods or sub plans.

The CEMP documents all the procedures and processes necessary to ensure that all personnel comply with:

- legislative requirements and relevant non-statutory policies,
- specific environmental construction mitigation measures described in section 5 of this REF,
- requirements outlined in any relevant approvals, permits or licences, or requirements of any relevant stakeholders / landowners.
- NS174C Environmental Handbook

The CEMP would typically:

- establish environmental goals and objectives,
- detail the conditions of approval,
- list actions, timing and responsibilities for implementation that arise from the construction mitigation measures recommended in this REF,
- detail statutory requirements,
- provide a framework for reporting on relevant matters on an ongoing basis,
- detail training requirements for personnel in environmental awareness and best practice environmental management system,
- detail emergency procedures, including contact names and corrective actions,
- detail process surveillance and auditing procedures,
- list complaint handling procedures, and
- detail quality assurance procedures.

The CEMP would be submitted to Ausgrid to be reviewed by an Environmental Officer prior to the commencement of any site works for an adequacy review to determine that the CEMP effectively addresses the scope of works to be undertaken, addresses the objectives described above and generally meets the requirements outlined in the *Guideline for the Preparation of Environmental Management Plans*[24].

No works covered by this REF would be permitted to commence until a suitable CEMP is prepared and reviewed as adequate by Ausgrid.

It is also noted that the CEMP would be a working document and would be amended and continually improved over time. This would occur when there is a change in scope,

during the review process or when processes or strategies are found to be inadequate to mitigate potential environmental harm.

If an activity falls outside the scope of the REF (as defined by section 1.5) or if the mitigation measures outlined in section 5 cannot be implemented, then an additional approval would be required. The activity is not permitted to continue without an appropriate environmental assessment under the EP&A Act.

8.1.1 Implementation

The principal construction contractor would be responsible for implementing these controls during construction.

All personnel working on the proposal must be aware of their environmental obligations, responsibilities and have received the necessary training to meet the environmental obligations associated with their duties, as specified in the CEMP. Site induction training would be undertaken for all personnel to highlight sensitive work areas, explain the requirements of the CEMP, outline an individual's responsibilities and inform all personnel of emergency response procedures. Documented evidence of such training would be available before commencing work on-site.

Prior to works commencing:

- emergency procedures would be displayed in a prominent position within the site working area,
- a person would be allocated for the dissemination of general information on the site operations. A contact person and contact numbers would be identified for receiving comments or complaints from the community, and
- a register for complaints would be established and maintained for the full duration of the work. The register would record details of complaints, complainant contact information and action taken to address complaints.

Auditing of the construction would be undertaken in accordance with the relevant international and Australian standards[25] to establish whether the Contractor is conducting activities in accordance with their current CEMP and whether the CEMP is an effective tool to control adverse environmental impacts. Recommendations regarding improvements to the CEMP must be incorporated as soon as practicable.

An Environmental Officer would be appointed to the proposal. The Environmental Officer has the authority to stop works if it is deemed necessary to mitigate potential environmental harm.

8.1.2 Compliance

The contractor is required to have an auditing and inspection schedule. Ausgrid may undertake audits to ensure the CEMP is being implemented appropriately.

At the conclusion of the construction phase of the proposal, The Contractor must record how and whether the conditions and measures in the REF and CEMP were observed. The documentation must be sufficient to enable a reasonable person who reads the documentation to understand, without reference to any extrinsic material, whether the conditions and measures in question were observed, and the nature of and reasons for any non-compliance.

9 Certification

The Concord Zone 11kV Switchgear Replacement REF assesses the potential impacts of the proposal to construct, operate and maintain a new switchroom building.

Ausgrid is an authorised network operator under the *Electricity Network Assets (Authorised Transactions) Act 2015* (ENA Act). Under section 41 of the ENA Act and clause 277(5) of the Environmental Planning and Assessment Regulation 2000. development by or on behalf of Ausgrid for the purpose of an electricity transmission or distribution network (within the meaning of State Environmental Planning Policy (Infrastructure) 2007) constitutes the carrying out of that development by the authorised network operator as an electricity supply authority and public authority. As such, Ausgrid is a determining authority as defined in the EP&A Act. The proposal satisfies the definition of an activity under the EP&A Act, and as such, Ausgrid as a proponent and determining authority, must assess and consider the environmental impacts of the proposal before determining whether to proceed.

This REF examines and takes into account to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposed activities outlined in the section 1.5. This REF fulfils the requirements of section 5.5 of the EP&A Act and clause 228 of the EP&A Regulation, which sets out environmental factors to be considered in making the assessment.

On the basis of this REF, it is concluded that the proposal:

- is not likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats
- is not on land that is part of critical habitat
- is not likely to have a significant impact on matters of NES, or a significant impact on the environment (for actions on Commonwealth land) or a significant impact on the environment on Commonwealth land (for actions outside Commonwealth land).

In making these conclusions, consideration of environmental significance was made with regard to clause 228 of the EP&A Regulations and the *Code of Practice for Authorised Network Operators*[1].

REF preparer:

I certify that I have prepared the contents of this REF and, to the best of my knowledge, it is in accordance with the Code approved under clause 244K of the Environmental Planning and Assessment Regulation 2000, and the information it contains is neither false nor misleading.

Signature: 

Name: Dan Halton

Title: Environment Officer

Company: Ausgrid

Date: 20th September 2021

REF reviewer:

I certify that I have reviewed the contents of this REF and, to the best of my knowledge, it is in accordance with the Code approved under clause 244K of the Environmental Planning and Assessment Regulation 2000, and the information it contains is neither false nor misleading.

Signature:

Name: James Hart

Title: Manager- Environmental Services

Company: Ausgrid

Date: 20th September 2021

Project manager acceptance:

I accept the description of the proposal outlined in section 1.5 as true and accurate and I commit to the implementation of the mitigation measures outlined in section 5.

Signature:

Name: Geoff Doherty

Title: Senior Project Manager

Company: Ausgrid

Date: 20th September 2021

Appendix A Architectural and Shadow diagrams

Appendix B Consultation

Appendix C Contamination, Waste Classification and Geotechnical

Appendix D Noise Modelling and Construction Assessment

Appendix E Electric and Magnetic Field Modelling and EME Guide for Site Safety

Appendix F Ecological and Arbor Assessments

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