Review of Environmental Factors
Picnic Point to Revesby Cable Project

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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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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
AHIP	Aboriginal Heritage Impact Permit
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.
BGHF	Blue Gum High Forest
Blue Book	*Managing Urban Stormwater - Soils and Construction* (Landcom, 2004)
BCA	*Building Code of Australia* (Australian Building Codes Board, 2011): 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.
BC Act	*Biodiversity Conservation Act 2016*
CEMP	construction environmental management plan
Classified road	The *Roads Act 1993* provides for roads to be classified as Freeways, Controlled Access Roads, Tollways, State 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
DA	development application
dB(A)	decibels (A) weighted

Determining authority	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. *Note: In practice, this will mean either the Minister, the local Council, Ausgrid (when self-determining works under Part 5), or other public authority from whom Ausgrid requires concurrence.*
DG	Ausgrid's distribution guideline
DM	demand management
DP&E	Department of Planning and Environment (NSW)
DPI	Department of Primary Industries (NSW)
DTS	distributed temperature sensing
Easement	A collection of rights allowing an entity to undertake certain activities. Easements acquired by Ausgrid are created by a lease, a transfer granting easement, an instrument registered with a deposited plan, or by acquisition.
EEC	Endangered Ecological Community: an assemblage of plant species that is recognisably different from other communities due to differences in species present and structure. The species form complex interactions with not only other species, but also elements of the landscape including underlying geology, aspect and altitude, and external influences such as fire frequency. Many ecological communities have limited natural distributions and are vulnerable to change, while others historically occurred over a wider area and are threatened by changes due to broad scale clearing, fragmentation, invasion by weeds, fire frequency or hydrological regime.
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.
Flood liable land	Land that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled *Floodplain Development Manual: the management of flood liable land* (NSW Government, 2005). Such land is commonly identified in Local Environmental Plans or Development Control Plans.
GHG	greenhouse gas
GIS	gas insulated switchgear
Ha	hectare
Hz	hertz
HCA	Heritage Conservation Area

HDPE	high-density polyethylene
IARC	International Agency for Research on Cancer
ICES	International Committee on Electromagnetic Safety
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.
kg	kilogram
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*.
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service (OEH)
NPI	*Noise Policy for Industry (EPA, 2017)*

OCPs	Organochlorine pesticides
OEH	Office of Environment and Heritage
OEMP	operation environmental management plan
OHEW	overhead earth wire
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyls
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PPS	parallel plate separator
PVC	polyvinyl chloride
Principal contractor	Work Cover defines a principal contractor as a person conducting a business or undertaking (PCBU – the new 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.
Ramsar wetland	An area designated for inclusion in the List of Wetlands of International Importance under Article 2 of the Convention on Wetlands of International Importance especially as Waterfowl Habitat done at Ramsar, Iran, on 2 February 1971 (as amended and in force for Australia from time to time) or declared by the Commonwealth Minister for the Environment under the EPBC Act.
RAP	remediation action plan
REF	review of environmental factors
REP	Regional Environmental Plan: a type of EIP 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.
Roadwork	Includes any kind of work, building or structure (such as roadway, footway, bridge, tunnel, road-ferry, rest area, transit way station or service centre or rail infrastructure) that is constructed, installed or relocated in the vicinity of a road for the purpose of facilitating the use of the road as a road, the regulation of traffic on the road or the carriage of utility services across the road, but does not include a traffic control facility. Carry out road work includes any activity in connection with the construction, erection, installation, maintenance, repair, removal or replacement of a road work.
SANSW	Subsidence Advisory NSW
SEPP	State Environmental Planning Policy: a type of EIP made under Part 3 of the EP&A Act.
SF_6	Sulphur hexafluoride
SHFA	Sydney Harbour foreshore area as defined by the Placement Management NSW Act 1998.

SHR	State Heritage Register
SSD	State Significant Development
SSI	State Significant Infrastructure
SSRW	Sydney Sandstone Ridgetop Woodland
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.
STIF	Sydney Turpentine Ironbark Forest
SWMP	soil and water management plan
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.
UGOH	underground overhead: a structure which facilitates the transition of underground cabling to aerial construction.
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 construct, operate and maintain two 132kV sub-transmission feeders between TransGrid's Sydney South Bulk Supply Point in Picnic Point and Ausgrid's Revesby Zone Substation in Revesby. The feeder route traverses through the Canterbury-Bankstown local government area (LGA).

Generally, the conduits will be installed by standard trenching methods and the trenches backfilled with a thermally stable material. The 132kV feeders will be pulled through the conduits in sections and feeder jointing undertaken in joint bays which would be installed along the route. The route length of the proposal will be approximately 3.3 km.

Other infrastructure that would be constructed as part of the project includes joint bays, communication pits, distributed temperature sensing pits, feeder pulling pits and new cable sealing end support structures within the substations.

The proposed works include the retirement of two existing fluid-filled 132kV feeders between TransGrid's Sydney South BSP and the Revesby ZS. This will involve cutting, capping and making the cable safe; draining any free fluid from the cable and purging; and removal of any underground and aboveground fluid tanks.

As part of the Construction Environmental Management Plan (CEMP) prepared for the works a Fluid Filled Cable Decommissioning Plan will be required. This will assess the route for high risk (environment) locations and consider the need for additional works, such as installing additional drainage points.

Construction of the proposal would be expected to commence in December 2018 with commissioning expected in October 2019, subject to assessment and approval.

Background and need

Replacement of the fluid filled cables between Revesby Zone Substation and TransGrid's Sydney South Substation is driven by asset condition issues. The proposal is also part of a broader Ausgrid program to remove fluid filled sub transmission cables from the network on a prioritised basis. In particular, Ausgrid seeks to decommission fluid filled cables from water crossings and sensitive environmental areas to reduce the risk of environmental damage associated with potential leaks.

Proposal alternatives

The design and location of the proposal resulted from an options investigation. Alternatives considered include maintaining current supply infrastructure, demand management initiatives, various network options, and route options. Following the selection of the chosen route this REF has assessed the proposal to ascertain whether there would be a significant impact upon the environment to meet the requirements of section 111 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*.

Other approvals required for the proposal include working within National Parks.

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 Picnic Point and Revesby Cable Project proposal.

Key issues associated with the proposal were identified as traffic and access and electric and magnetic fields. 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 would facilitate the removal of the existing feeders from service as they are approaching the end of their serviceable lives. This work would both reduce the risk of environmental damage associated with potential leaks and help maintain a reliable supply of electricity, hence meeting Ausgrid's obligations in terms of safety, reliability, quality and continuity of supply.

On the basis of 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 REF assesses the proposal to construct, operate and maintain two 132kV sub-transmission feeders between TransGrid's Sydney South Bulk Supply Point (BSP) in Picnic Point and Ausgrid's Revesby Zone Substation (ZS) in Revesby. The feeder route traverses through the Canterbury-Bankstown local government area (LGA).

Generally, the conduits will be installed by standard trenching methods and the trenches backfilled with a thermally stable material. The 132kV feeders will be pulled through the conduits in sections and feeder jointing undertaken in joint bays which would be installed along the route. The route length of the proposal will be approximately 3.3 km.

Other infrastructure that would be constructed as part of the project includes joint bays, communication pits, distributed temperature sensing pits feeder pulling pits, and new cable sealing end support structures within the substations

The proposed works include the retirement of two existing fluid-filled 132kV feeders between TransGrid's Sydney South BSP and the Revesby ZS. This will involve cutting, capping and making the cable safe; draining any free fluid from the cable and purging; and removal of any underground and aboveground fluid tanks.

As part of the Construction Environmental Management Plan (CEMP) prepared for the works a Fluid Filled Cable Decommissioning Plan will be required. This will assess the route for high risk (environment) locations and consider the need for additional works, such as installing additional drainage points.

Other infrastructure that would be constructed as part of the project includes:

- communication pits
- distributed temperature sensing pits
- cable pulling pits
- joint bays
- link box pits.

1.2.1 Proposal location

The proposed works are in the Canterbury-Bankstown LGA. For the purpose of this assessment, the proposal site is defined as the proposed feeder route as shown in Figure 1-1. The proposed feeder starts at TranGrid's Sydney South BSP within the Georges River National Park in Picnic Point and continues for a length of 3.3 km south towards the Revesby ZS located on Tarro Avenue, Revesby. For the most part, the route will be within the existing trafficable roadway with the exception of installation within the Georges River National Park between Kennedy St and TransGrid's Sydney South BSP. The works within the Georges River National Park will be assessed under a separate REF.

Figure 1-2 shows the proposal location within Ausgrid's network area.

Figure 1-1: Proposed route

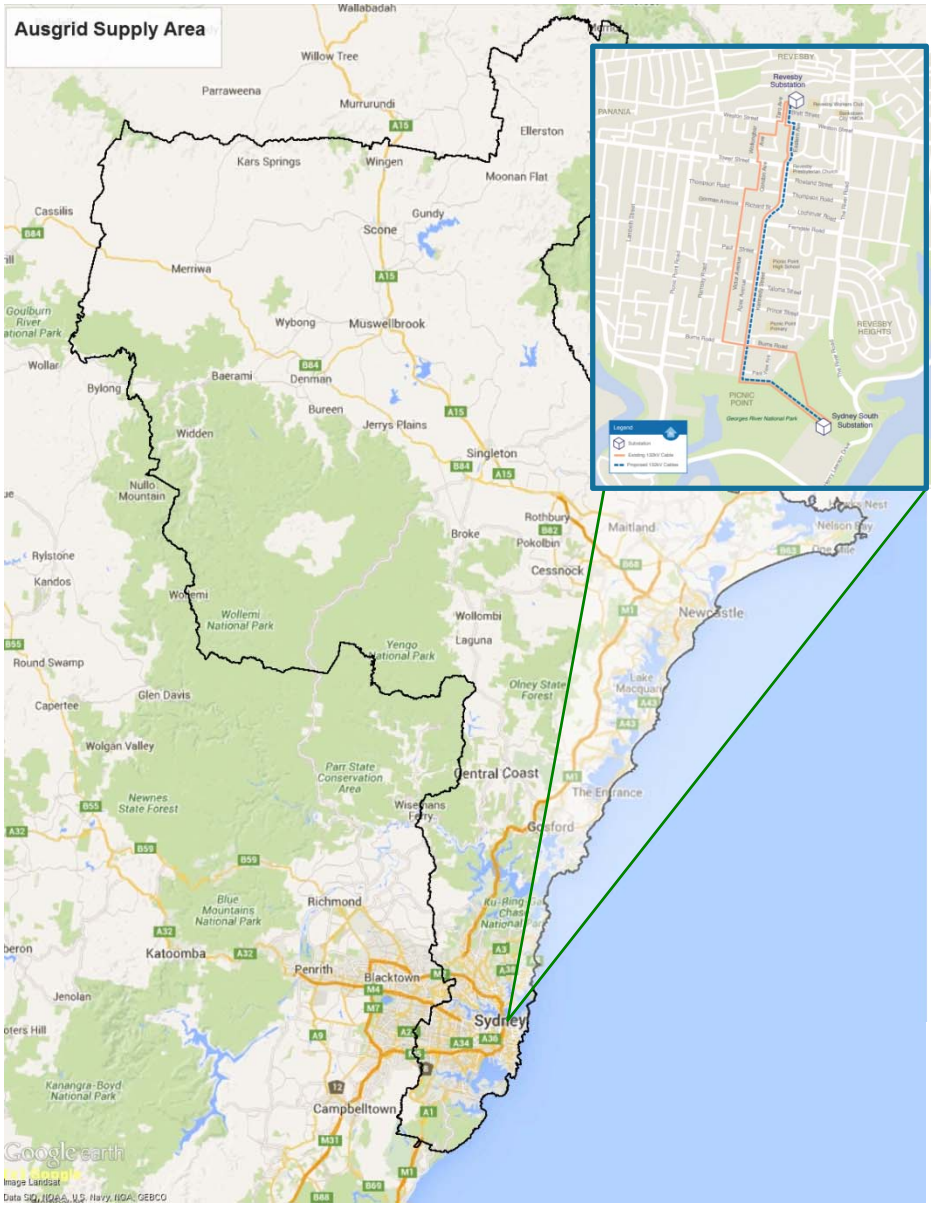

Figure 1-2: Proposed location within Ausgrid's network area

1.2.2 Proposal objectives

The objective of the proposal is to construct, operate and maintain new 132kV underground feeders between TransGrid's Sydney South BSP and Ausgrid's Revesby ZS to enable the decommissioning of the existing fluid filled cables. 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

Replacement of the fluid filled cables between Revesby Zone Substation and TransGrid's Sydney South Substation is driven by asset condition issues. The proposal is also part of a broader Ausgrid program to remove fluid filled sub transmission cables from the network on a prioritised basis. In particular, Ausgrid seeks to decommission fluid filled cables from water crossings and sensitive environmental areas to reduce the risk of environmental damage associated with potential leaks.

1.4 Related projects

Ausgrid projects typically have related projects and flow on activities due to the interconnected nature of the network. These related projects would be subject to separate environmental impact assessments due to factors such as differences in funding, construction timeframes and design.

A project associated with the proposal which was assessed separately under the relevant provisions of the EP&A Act is the 132kV feeder 282 & 283 protection replacement at Sydney South BSP. This project was completed in December 2017.

Known material cumulative impacts associated with these related projects are addressed in section 5.17.

1.5 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 proposed feeder 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.

1.6 Description of the proposal

1.6.1 Overview

This REF assesses the proposal to construct, operate and maintain two 132kV sub-transmission feeders between TransGrid's Sydney South Bulk Supply Point (BSP) in Picnic Point and Ausgrid's Revesby Zone Substation (ZS) in Revesby. The feeder route traverses through the Canterbury-Bankstown local government area (LGA).

Generally, the conduits will be installed by standard trenching methods and the trenches backfilled with a thermally stable material. The 132kV feeders will be pulled through the conduits in sections and feeder jointing undertaken in joint bays which would be installed along the route. The route length of the proposal will be approximately 3.3 km.

Other infrastructure that would be constructed as part of the project includes joint bays, communication pits, distributed temperature sensing pits feeder pulling pits and new cable sealing end support structures within the substations.

The proposed works include the retirement of two existing fluid-filled 132kV feeders between TransGrid's Sydney South BSP and the Revesby ZS. This will involve cutting, capping and making the cable safe; draining any free fluid from the cable and purging; and removal of any underground and aboveground fluid tanks.

As part of the Construction Environmental Management Plan (CEMP) prepared for the works a Fluid Filled Cable Decommissioning Plan will be required. This will assess the route for high risk (environment) locations and consider the need for additional works, such as installing additional drainage points.

The following sections details the physical structures (section 1.7), construction activities (section 1.8) and operation and maintenance activities (section 1.9) associated with the proposal.

1.6.2 Design

A copy of the conceptual design plans and drawings are contained within in Appendix A. It should be noted that the designs are accurate at the time of printing; 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.

1.6.3 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.

The existing underground feeders are installed within Georges River National Park in an existing easement. The proposed feeders will stay within this easement, except where they can be placed within the disturbed access track thus reducing the requirement for removing established vegetation. Ausgrid obtained consent from the

Office of Environment and Heritage to complete these works under the National Parks and Wildlife Regulation 2009. Refer to Appendix G for the approval and determination notice from the NSW National Parks and Wildlife Service Once the exact location off the feeders is known after installation an extension of the easement will be obtained.

1.7 Physical structures

1.7.1 Underground feeders

The proposal consists of two underground feeders (see Figure 1-1 for locality plan and power line route). The feeders would each have three cables in in a trefoil arrangement which would transfer electricity at 132 kV along with fibre optic communications cables.

All new 132 kV underground feeders would have a maximum summer rating of 250 MVA.

1.7.2 Joint bays, feeder pulling pits, ancillary pits and feeder installation

Joint bays would be required along the proposed route to join sections of the underground feeders. The typical joint bay would be approximately 10 m long by 3.6 m wide by 1.5 m deep. Variation may occur during the detailed design stage as a result of adjacent services and/or ground conditions. The final location of the joint bays will be determined during the detailed design stage. Nearby land occupiers will be consulted with once joint bay locations are determined.

Other infrastructure that would be constructed as part of the project includes joint communication pits, distributed temperature sensing pits and feeder pulling pits.

1.7.3 Terminations at Revesby and Sydney South BSP

Outdoor terminations at both Sydney South BSP and Revesby ZS will be required. New footings and cable sealing end structures will be installed within the substations and new connections will be formed to the existing High Voltage busbars.

1.8 Construction activities

The precise construction methodology would be determined before construction commences. The works would be undertaken by a contractor, selected after a competitive tendering process, who would be responsible for detailed design and planning of 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 mitigation measures detailed in this REF. The mitigation measures detailed in this REF must be included in the contractor's construction environmental management plan (CEMP).

The anticipated sequence of works for the proposal would include:

- survey work
- establishing temporary construction facilities
- performing trial-hole excavations and reinstatement
- 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 along the sections of proposed route
- saw cutting to remove / recycle concrete or asphalt pavement
- new cable sealing end termination structures which would include foundations.
- excavating feeder trenches
- underboring
- laying conduit / cable and backfilling
- pulling feeders through conduits
- storing and stockpiling equipment
- dewatering
- jointing
- testing and commissioning
- draining and capping sections of redundant underground feeders being left in situ
- decommissioning redundant underground feeders in situ
- removal of any underground and above ground fluid tanks
- 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).

1.8.1 Construction access, parking, site compounds and stockpiles

The construction site would be transient in nature and therefore construction access during work would be restricted to and from the designated work site within the public roadway and pedestrian paths. A traffic management plan (TMP) would be prepared prior to commencement of work and would allow for site access. Traffic routes to and from the construction area would be noted in the TMP.

Each construction area would require a site compound containing basic amenities, plant and material storage areas. These compound areas would be strategically located to minimise the number of times relocation is required. Siting of a compound area would involve consultation with the neighbouring properties, maximising separation from sensitive receivers and protection of surrounding infrastructure and environment (including trees) whilst maintaining access to private properties.

The worksite would be in lengths of approximately 100 m each day, inclusive of traffic management, equipment storage (e.g. excavators, conduits and waste bins etc.) and safety barriers. The typical width of the construction site would be approximately two lanes of traffic wide depending on the location. There may be multiple worksites in operation at any one time.

Prior to the commencement of works, a pre-construction survey would be undertaken for all nearby council assets and public infrastructure, e.g. kerbs, footpaths, fences. This would likely be in the form of digital photographs.

Surface materials such as asphalt, cement, grass or vegetation would be removed to expose the underlying ground. Generally, spoil to an approximate width and depth of 1400mm would be removed and where unsuitable for backfill would be transported and disposed of off-site in accordance with EPA Waste Classification Guidelines 2014. Any spoil requiring on site storage would be subject to the controls in the CEMP and the conditions of this REF.

Reinstatement of the affected areas would be undertaken in consultation with the relevant authority (e.g. Canterbury-Bankstown Council, Roads and Maritime Services (RMS) and Georges River National Park).

1.8.2 Construction fencing

Temporary construction barriers would be placed around the construction site and site compound. During construction, signage would be displayed in accordance with WH&S Regulations for construction sites. This would include danger and protective equipment signs. Community signs displaying the community contact information would be fixed to construction fencing around site compounds. This would be in addition to the community signs with the same information that would be located around the moving work site.

1.8.3 Installation of underground feeders

The works would involve the installation of conduits by standard trenching methods except when avoiding tree roots/existing services where underboring or non-destructive digging would be used as required. Figure 1-3 is a depiction of the underground cable installation process.

Trenching works would be progressive with short lengths of approximately 20-30 m being open at a time. The trench would be dug using an excavator and would typically be approximately 1.5 m deep and 1.3 m wide and the conduits would be placed in a predominantly trefoil arrangement. Variation may occur during the detailed design stage as a result of adjacent services and/or ground conditions. Once each segment of trench is completed it would be backfilled and a new section of trench opened for the next segment of the route. The cables would then be pulled through in lengths of about 1200 m. The cables would be winched from cable drums (on a truck) through the conduits from one joint bay to the next in cable pull pits (commonly referred to as caterpillar pits). Each length of cable would be expected to take approximately two weeks to install.

Thermally stable backfill (TSB) would be placed around the conduits to provide a good operating environment. Once the trench is completed it would be backfilled with TSB to a minimum 100 mm above the conduits and then covered with soil excavated from the trench alignment or sand or road base depending on where the feeder is positioned (i.e. roadside verge or pedestrian path).

Temporary road reinstatement would take place shortly after the trench has been backfilled in order to minimise any environmental or traffic impacts. Permanent reinstatement would be undertaken to the relevant road standard in consultation with the appropriate road authority.

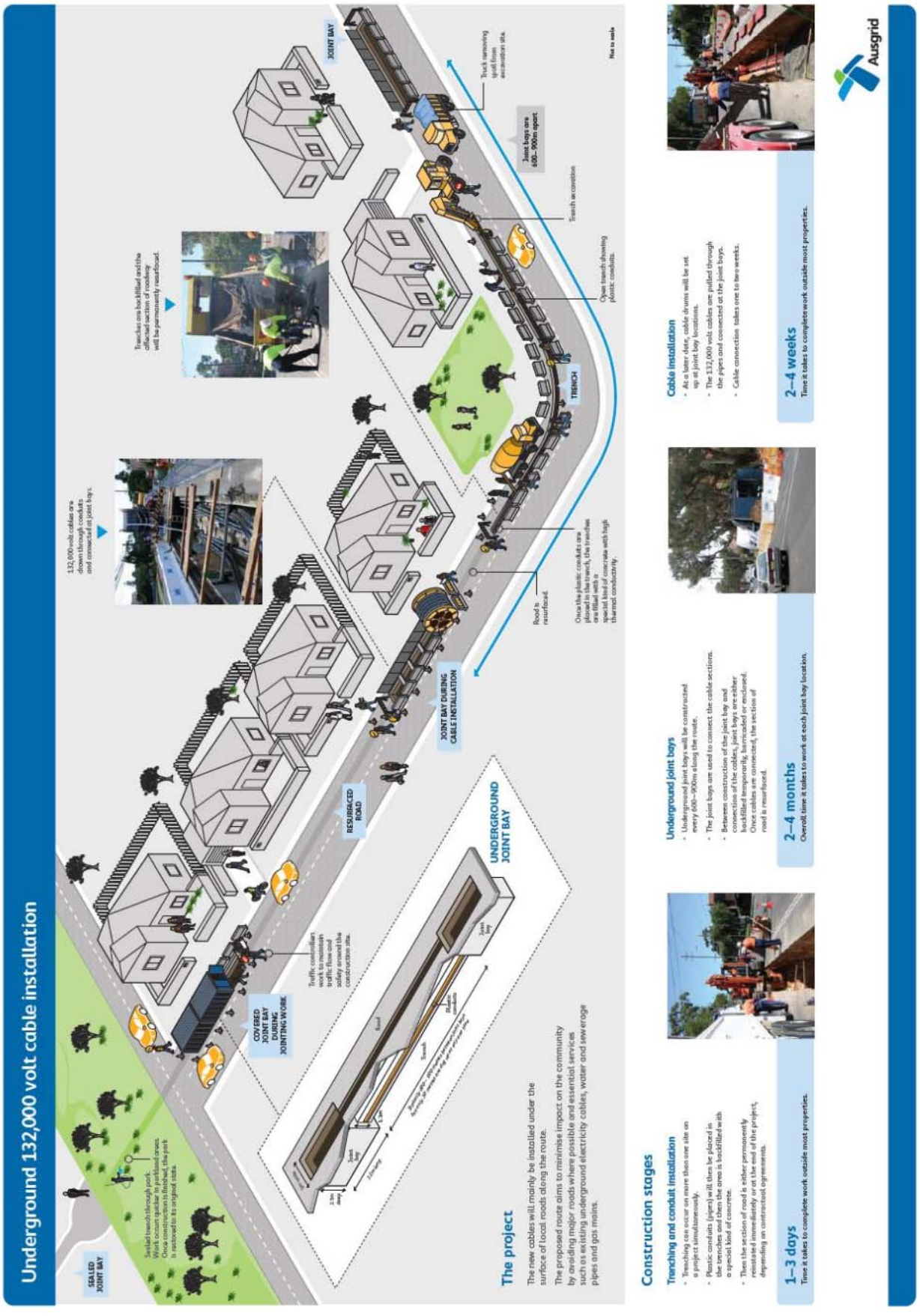

Figure 1-3: Underground 132 kV feeder installation

1.8.4 Joint bays, feeder pulling pits, ancillary pits and feeder installation

Construction of the joint bays would require excavation of the joint bay sites and the preferred methodology would be for precast joint bay installation or installation of form work and pouring of concrete. Construction of the bays would take an estimated two to three weeks to complete at each site. An enclosure would be installed at each joint bay during the installation of feeders to protect the feeders from environmental elements. Jointing activities are expected to take three weeks at each location. These bays would be backfilled with sand, covered and fully reinstated on completion of jointing works. A generator would be required to supply electricity during jointing activities. Other pits to be installed include communication pits, DTS pits and feeder pulling pits.

During these activities temporary security fencing, road barricades and tent / containers would be installed around the sites to manage traffic, restrict unauthorised access and protect staff working at the site. There would also be a security guard on site out of working hours.

1.8.5 Decomissioning of existing fluid-filled feeders and ancillary equipment

Sections of existing fluid-filled feeders along the route would be decommissioned, drained and removed as part of the works. Prior to being drained the feeders would be tested for PCB content. The fluid tanks would be removed and residual fluid drained. Sections of feeders being left in situ would be drained and capped. Activities associated with the handling and transportation of the feeders would be subject to the conditions of this REF, Ausgrid Network Standards and relevant legislative requirements and be reflected in the CEMP. Some of these conditions include:

- handling and transporting removed fluid-filled feeders in an environmentally safe manner and with due care to prevent spillage
- ensuring all personnel involved in the handling and transport of fluid-filled feeders 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 appropriately.

1.8.6 Vegetation clearing

Vegetation clearing and pruning would be required in some sections of the proposed route to allow for the underground feeders to be installed. There will be for a distance of 100m where Ausgrid's proposed cables will run in parallel with our existing cables and Transgrid's cables and the construction will require removal of regrowth vegetation to obtain clearances from the existing assets. The existing vegetation should be cut and used on site for brush matting to reduce the potential for erosion and sedimentation issues and also potential for invasion of exotic species. Impact on flora and fauna is described in section 5.10.

1.8.7 Vegetation rehabilitation

There will be a distance of 100m where Ausgrid's proposed cables will run in parallel with our existing cables and Transgrid's cables and the construction will require removal of regrowth vegetation to obtain clearances from the existing assets. A rehabilitation plan will be developed in co-ordination with Georges River National Park and Bankstown Bushland Society. This will involve implementing weed management to control existing exotic species in the area and reduce the potential for their spread.

1.8.8 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.

1.8.9 Permanent reinstatement

Permanent reinstatement of the roadways would occur at the completion of the works. This would involve milling the existing roadway immediately adjacent to the trench, re-sheeting and re-line marking where required. While these works are to be completed in stages, they will require lane closures and, in some cases, total closure of roads in order to safely carry out the works. Asphalting works in proximity to RMS classified roads would need to occur when traffic volumes are reduced during evening and night periods as directed by the relevant road authority. Approvals from the RMS or regulator will be required prior to working on classified roads. Requirements for notifications for out of hours work are detailed in section 1.8.10.

1.8.10 Timing and working hours

Subject to assessment and approval, work is expected to commence in late 2018 and would take approximately 9-12 months to complete.

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.
    - Where it is environmentally and socially beneficial and this is supported by Ausgrid's Project Manager, Community Relations Section and Environmental Services.

1.8.11 Resources and equipment

There would be approximately 50 personnel employed during the construction phase, with approximately 15 per construction crew. 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:

- large rock breaking equipment
- large and small excavators
- concrete form work
- horizontal borer
- crane
- truck mounted borer
- backhoe
- trucks for material transport including soil, concrete and cable
- elevated work platforms
- mulcher / chipper
- saw cutting machine with vacuum and transport utility
- grader
- traffic management devices
- cable winch (for high voltage)
- cable trucks
- portable / roller compactor
- compressor
- plate compactor
- traffic control vehicles
- fire suppression
- power generator
- construction fencing
- street sweeper vehicles
- dust suppression vehicles
- water tankers
- pumps
- skip bins
- tipper
- temporary construction facilities
- associated minor construction equipment.
- pollution prevention equipment.
- asphalt paving machines
- slip forming machines
- milling machines
- curing machines
- rollers
- bitumen sprayer
- site sheds/port-a loos etc.

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

- asphaltic concrete
- conduits
- imported soil for engineered fill and topsoil
- blue metal gravel / crushed rock
- landscape supplies
- retaining walls
- landscape supplies
- energy sources such as fuel and oils
- pollution prevention materials
- TSB
- cables
- communication cables
- concrete and reinforcement
- plants and vegetation

1.9 Operation and maintenance requirements

Access to the underground feeder would only be required when the feeder requires repair or maintenance. Repair events would happen on an infrequent basis and would require excavation to gain access. Most of the feeders would be located in the roadway allowing ready access for timely repairs, however, it may cause impacts to traffic movement in the immediate area.

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 and are completed are undertaken.

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 where works involve a substation or may impact upon Council infrastructure, the community or local heritage items. Works involving a substation also require 21 days notification to occupiers adjoining that land. In some instances, other public authorities need to be notified (see Table 2-2).

The proposal requires 700m of replacement cable installation within the Georges River National Park as it exits TransGrid's Sydney South Bulk Supply Point (BSP).. Ausgrid obtained consent from the Office of Environment and Heritage to complete these works under the National Parks and Wildlife Regulation 2009. Refer to Appendix G for the approval and determination notice from the NSW National Parks and Wildlife Service.

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.

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

Table 2-1: Consultation responses

Submission No.	Respondent	Notification requirement	Comment raised	Ausgrid's response
1.	City of Canterbury Bankstown Council	ES Act Infrastructure SEPP	No objection to the project	Ausgrid continues to consult with the Canterbury Bankstown Council in regards to the project
2	OEH	National Parks and Wildlife Act	National Parks support the installation of the cable within the existing disturbed access track.	Ausgrid continues to consult with the Georges River National Park in regards to the project

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 community feedback on the replacement route as a part of the planning process. Ausgrid seeks to balance community feedback with other project considerations in finalising the route and construction program and as part of a sustainable decision making process. Consultation documentation that has been developed for this project can be seen in Appendix B.

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:

- Ausgrid started engaging with key stakeholders, such as City of Canterbury Bankstown Council, TransGrid and the Members of Parliament earlier this year in the areas where the new cables could be laid
- Ausgrid consulted the local community to outline the proposed works. Engagement with residents and businesses along and around the replacement cable route started in April 2018 when the first project newsletter was distributed
- In April 2018, Ausgrid conducted a community information session to inform the broad community about the proposed work, why the project is required and to seek local area information to assist with confirming a preferred route
- Interested community members were invited to the information session directly through the newsletter, social media and advertisement in local newspaper
- A detailed presentation focusing on the project need, planning to date and the construction process was shared with the community members who attended the information session. This presentation and other community information is available on the project web page
- 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 have and will 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
- 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.
- The Review of Environmental Factors (REF) was placed on public exhibition for a three week period between 7 September and the 29 September 2018, for community comment and submissions before the project is assessed for construction approval.

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

Table 2-2: Community consultation issues summary

Issue	Response
Traffic impacts on Kennedy Street, Weston Street and Brett street during peak time	There will be a traffic management plan developed as part of the Construction Environmental Management Plan and smaller plans developed for each work area. There will be temporary short term traffic impacts during construction. Traffic control is used so that our work is safe for drivers, pedestrians and workers on site and to minimise impacts. Before any work starts, Ausgrid prepares traffic management plans (TMPs) and site specific traffic control plans (TCPs). These plans are reviewed by the relevant council or by Roads and Maritime Services (depending on the road). The TMPs and TCPs consider the surrounding community in regards to safety and to minimise disruption. The relevant road authorities also usually direct Ausgrid to complete works on busier roads at night, which Ausgrid tries to avoid especially in residential areas. During construction, a section of the road would be closed for traffic with access maintained to residential traffic only. Other streets may have temporary parking restrictions or detours put in place. These arrangements would form part of the traffic management plans to enable Ausgrid to complete work as quickly and as safely as possible. Ausgrid will consider and discuss with the relevant authority any reasonable requests from the community to potentially minimise impacts on traffic and parking. The community will be notified of any impacts in advance.

Issue	Response
Construction impacts on residents and schools in the area	Ausgrid will finish the construction work around the school during the term holidays to avoid any direct impact to the students. During construction, Ausgrid and our contractor for the civil component would be required to work under the REF conditions of the project .There will be traffic, parking, and some noise and vibration impacts associated with the work, but Ausgrid will put measures in place to minimise these as much as possible. Before starting any work, Ausgrid carries out an assessment of potential noise and vibration impacts. All work is completed in line with the results of the assessment, the Construction Environmental Management Plan and Ausgrid's environmental management policies. During the work, there will be some temporary changes to traffic and parking arrangements in some streets. Ausgrid will work closely with Council and Roads and Maritime Services (RMS) to minimise our impact on the local road network. A detailed Traffic Management Plan will be prepared in consultation with Council, RMS and other key stakeholders. Ausgrid has held a meeting with the principal of Picnic Point Public School in July and has factored concerns in the planning process. Ausgrid will continue to liaise directly with the impacted schools during development and construction. In addition, during construction, the community engagement team will be on hand and available via the 24 hour community information line (or via email or site visit) to discuss any concerns about the project.
Access to property during construction	Access to properties will be maintained at all times during construction, unless alternative arrangements have been made in advance with affected property owners.
Other services in the road	Ausgrid has already completed desktop studies, using Dial Before You Dig drawings that identify existing services. In addition, site investigations are completed to physically identify underground services as well assess the ground conditions. In areas where they are many underground services, Ausgrid would modify construction activities, often hand digging around the infrastructure.

Issue	Response
Work with Council to avoid digging up roads that they plan to resurface	Ausgrid has been in consultation with the Canterbury Bankstown Council and has shared details of the area where we plan to install cables to receive local information as well as to get details on their program of works. Ausgrid will continue to liaise with the Council throughout all stages of the project to keep Council updated on our plans and to coordinate works where possible to try to minimise having to excavate after any council road restoration.

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 and door knocking at properties close to joint bays to provide these stakeholders with more information on potential impacts.
- A 24 hour community information line, project email address and web page.
- Signage along the route and at site compounds to ensure community members are aware of who is carrying out the work. Signage would include details of the project community information line.
- Notifications to residents and other neighbours seven days prior to the start of work in their local area 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

2.3.3 Aboriginal community

A due diligence assessment indicated that the proposal is not likely to harm Aboriginal objects or places. Aboriginal cultural heritage consultation was not required.

3 Investigation of alternatives for the proposal

3.1 Assessing alternative options

As part of developing this proposal, consideration was given to alternative sites, 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 the load continues to grow on the network, 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 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.

3.4 Network options

3.4.1 Option 1: Replacement of existing feeders from Revesby ZS to TransGrid's Sydney South BSP.

This option involves the installation of two new 132kV feeders from Sydney South BSP to Revesby zone substation in a combined trench, including secondary systems works and civil works as required. These feeders will replace existing 132kV feeders 282/1 and 283/1 between Revesby zone substation and Sydney South BSP.

3.4.2 Option 2: Replacement of feeders with new underground feeders from Bankstown STS

This option involves the replacement of feeders 282/1 and 283/1 with underground feeders from Bankstown STS to Revesby zone substation.

3.4.3 Option 3: Replacement of existing feeders from Revesby ZS to TransGrid's Sydney South BSP with an overhead feeder

This option involves the installation of two new 132kV feeders from Sydney South BSP to Revesby zone substation with two overhead feeders, including secondary systems works and civil works as required. These feeders will replace existing 132kV feeders 282/1 and 283/1 between Revesby zone substation and Sydney South BSP.

3.4.4 Preferred network option

The preferred option is Option 1 as it the least cost for underground feeders, as it is the shorter feeder route compared to Option 2. There is also less scope for community concern given the feeder is following the alignment of an existing feeder. Further consideration into the overhead option was not undertaken as it would require substantial works to clear vegetation within the Georges River National Park, who would be the consent authority for these works. There would also be limited street options for the route to Revesby and major community impact and opposition would be expected.

3.5 Route options

Selection of the preferred cable route requires balancing technical needs with project costs, environmental attributes and impacts on the broader community.

Ausgrid has two easements within Georges River National Park that contain the existing fluid filled cables that are to be replaced. The route of the two feeders can be seen in the diagram below.

Figure 3-1 Map indicating location of existing feeders within Georges River National Park

The preferred option is to replace the existing fluid filled cables within the western (pink) alignment as shown in plan above. This route was chosen as the route to the east is heavily vegetated. Through consultation with National Parks it was decided that some sections of the feeder would be installed within the access track outside the easement. This will ensure that there is a reduced impact on biodiversity and cultural heritage.

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
- 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 (Coastal Management) 2018
- SEPP 44 – Koala Habitat Protection
- SEPP 55 – Remediation of Land
- SEPP 71 – Coastal Protection
- SEPP - Vegetation in Non-Rural Areas 2017
- Bankstown LEP 2015

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 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018) will exclude the application of the Infrastructure SEPP for some developments which are located on land identified as “coastal wetlands” or “littoral rainforest”, or development which is coastal protection works. . There are no “coastal wetlands” or “littoral rainforest” located near the area of the proposal, nor is the land identified as a proximity area for coastal wetlands or littoral rainforest. As such the proposal would not impact upon land captured by the Coastal Management SEPP.

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.

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
- 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 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. Refer to section 4 for licences that may be required for the proposal. Regardless of whether a licence is required, the following restrictions during construction and operation of the proposal apply:

- works must not pollute the environment
- waste must be classified, handled, transported and disposed appropriately
- environmental incidents involving actual or potential harm to human health or the environment must be 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, s 7.8 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, s 7.2 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:

- *Biodiversity Conservation Act 2016 (NSW)*
- *Coastal Management Act 2016* (NSW)
- *Crown Lands Act 2016* (NSW)
- *Fisheries Management Act 1994* (NSW)
- *Forestry Act 2012* (NSW)
- *Heritage Act 1977* (NSW)
- *Hunter Water Act 1991* (NSW)

- *Mine Subsidence Compensation Act 1961* (NSW)
- *National Greenhouse and Energy Reporting Act 2007* (NSW)
- *National Parks and Wildlife Act 1974* (NSW)
- *Native Title Act 1993* (Commonwealth)
- *Biosecurity Act 2015 (NSW)*
- *Roads Act 1993* (NSW)
- *Rural Fires Act 1997* (NSW)
- *Water Act 1912* (NSW)
- *Water Management Act 2000* (NSW)
- *Water NSW Act 2014*
- *Wilderness Act 1987* (NSW).

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
Biosecurity Act 2015	DPI	**General**: There is a general duty to prevent, eliminate or minimise biosecurity risks, which are broadly defined in s 13. Schedule 1 imposes a specific duty to prevent, eliminate or minimise any biosecurity risk posed or likely to be posed by weeds on or near roads, watercourses, rivers, inland water, or irrigation areas.	Biosecurity is addressed in section 5.10.	Ausgrid / Contractor
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 when they become aware of the contamination.	If contamination is discovered the duty to report would be determined.	Ausgrid/Principal Contractor
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 27th of March 2018 (see section 2.3).	Ausgrid
Infrastructure SEPP	Local Council	**Notification:** under s. 13-15, 21 days notice for substantial impact on council related infrastructure and local heritage or works in flood liable land that will change flood patterns other than to a minor extent.	Notice was given at the same time as the ES Act notification.	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/ Principal Contractor

Legislation	Authority	Requirement	Comment	Responsibility
National Parks and Wildlife Act 1974	OEH	**Approval:** under cl 11(1)(h) and 17(1)(c) to install underground high voltage cable.	Approval obtained on the 22nd October 2018. Refer to Appendix H.	Ausgrid
POEO Act	OEH	**General:** under s. 120, no 'dirty water' discharge into a stormwater drain.	Water management is addressed in section 5.6.	Ausgrid / Contractor
POEO (Waste Regulation) 2005	OEH	**General:** under cl. 24, Ausgrid must track transportation of certain waste.	Waste management is addressed in section 5.9.	Ausgrid
Greater Metropolitan REP No 2-Georges River Catchment	DP&E	**Consideration:** for the land use and development of the Georges River Catchment	The proposal is consistent with the objectives of the REP.	Ausgrid
Roads Act 1993	RMS	**Approval:** under s. 138, for road work on a Classified Road.	Approval for the crossing of Tower St has been obtained from the Canterbury Bankstown Council as the delegated authority.	Ausgrid / Contractor
Rural Fires Act 1997	NSW Rural Fire Service	**Consideration**: under s. 63, public authorities must take all practicable steps to prevent the occurrence and minimise the spread of bush fires on or from land vested in or under its control or management.	Bush fire is addressed in section 5.11.	Ausgrid / Contractor
Water Act 1912	OEH	**Permit**: under s. 113, to extract groundwater via any type of bore, well or excavation.	The need for a permit would be evaluated as part of preparation of the CEMP.	Ausgrid / 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 8 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 Canterbury-Bankstown LGA The land adjacent to the proposed route comprises residential, recreational, commercial and conservation.

Under the *Bankstown Local Environmental Plan 2015* (Bankstown LEP) the alignment is classified as:

- SP2 Electricity Transmission or Distribution Network at TransGrid's Sydney South BSP
- E1 National Park within Georges River National Park
- R2 Low Density Residential for the majority off the route between the Georges River National Park and the Revesby Zone Substation.
- B1 Neighbourhood Centre on the corner of Kennedy Street and Burns Road
- SP2 Educational Establishment which is Picnic Point Public School on Kennedy St
- B2 Local Centre on Tarro St to the south and east of the Revesby ZS which is Revesby Workers Club
- SP2 Rail Infrastructure which is the T8 Airport & South Line which is north of the Revesby ZS

A tenure assessment was undertaken to determine if the route is located on Crown land that is not public road or reserve as defined by s. 45 of the *Electricity Supply Act 1995*. Other utilities in the area are described in section 1.5.

5.1.2 Potential impacts

The proposal is consistent with the current surrounding land use. The proposal is also consistent with the objectives and land use zoning of the LEP. No potential impacts have been identified.

The existing underground feeders are installed within Georges River National Park in an existing easement. The proposed feeders will stay within this easement, except where they can be placed within the disturbed access track thus reducing the requirement for removing established vegetation. . Ausgrid obtained consent from the Office of Environment and Heritage to complete these works under the National Parks and Wildlife Regulation 2009. Refer to Appendix H for the approval and determination notice from the NSW National Parks and Wildlife Service Once the exact location off the feeders is known after installation an extension of the easement will be obtained 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.

Once constructed, the proposal would not restrict access to recreational space, commercial or industrial development or residential development. 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.	✓	✓	
Install feeders within the disturbed access track within Georges River National park to reduce impacts on aesthetic and recreational values.	✓		

5.1.4 Conclusion

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

- construction related impacts would be minor, localised and short-term
- a reliable supply of electricity would allow existing land uses to continue
- 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[2] and international standards[3] 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[4] 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
- 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.

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 such as Cable sealing end 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 feeders and substation. However, the new feeders 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.

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*[5] 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 8of 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.			✓
Materials sourced from local suppliers where cost effective and no impact on engineering properties.	✓	✓	
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
- issues such as electricity demand and location of existing electricity infrastructure have been considered in selecting the proposed site / route
- mitigation measures outlined in section 5.2.3 above 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 Picnic Point to Revesby area include 415V and 11kV powerlines (distribution network) and 132kV feeders (transmission network). Given the underground arrangement of the existing 132kV feeders, the magnetic field exposure along the majority of the route is likely to be dominated by sources within the home and the distribution network.

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

Magnetic Field Source	Range of Measurement (in mG)
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 1970's. 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[6] advises that:

> *"The scientific evidence does not establish that exposure to ELF EMF found around the home, the office or near powerlines and other electrical sources is a hazard to human health"*

These findings are consistent with the views of other credible public health authorities. For example, the World Health Organization (WHO)[7] 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."*

International Commission On Non-Ionizing Radiation Protection - 2010[8]

> *"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[9] 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[10] and Professor Hedley Peach in Victoria[11]. These reviews and inquiries have consistently found that:

- adverse health effects have not been established.
- the possibility cannot be ruled out.
- 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 calculations

A specialist EMF assessment was undertaken for the proposal by Aurecon. (Appendix C).

WHO advise that *"In the absence of a known biophysical mechanism, which would yield a known etiologically relevant metric of exposure, the metric of choice used in most epidemiological studies has been the time-weighted average."*

In consideration of the above, magnetic fields were calculated using the more relevant time weighted average. These were determined using the ultimate winter loadings of the feeders.

The predicted magnetic field contributions from the feeder(s) and joint bays for time weighted average is displayed in Table 5-5.

Table 5-5: Ultimate predicted magnetic field contribution of the new feeders

Distance from Centreline	Double Circuit Inverted Time-Weighted-Average	Typical Joint Bay Time-Weighted-Average	Staggered Joint Bay Time-Weighted-Average
-10m	0.1 mG	1.2 mG	3.5 mG
-8m	0.3 mG	2.3 mG	5.1 mG
-6m	0.6 mG	5.0 mG	8.2 mG
-4m	1.7 mG	13.5 mG	15.1 mG
-2m	6.8 mG	42.6 mG	36.4 mG
-1m	13.9 mG	65.6 mG	61.1 mG
0m	19.4 mG	76.7 mG	83.1 mG
1m	14.1 mG	65.6 mG	81.7 mG
2m	6.9 mG	42.6 mG	60.7 mG
4m	1.7 mG	13.5 mG	26.0 mG
6m	0.6 mG	5.0 mG	12.6 mG
8m	0.3 mG	2.3 mG	7.2 mG
10m	0.1 mG	1.2 mG	4.6 mG

Based on the worst case alignment within the proposed alignment window of the feeders:

- The highest predicted time-weighted average magnetic field contribution directly above the cable trench is 19.4mG This is less than 1% of the relevant ICNIRP general public exposure guideline level of 2000mG. At a distance of 10m from the centreline, the field contribution is predicted to reduce to a negligible level.
- In highly localised areas above the joint bays, the highest predicted time-weighted average magnetic field contribution directly above a staggered joint bay is 83mG. This is less than 5% of the relevant general public exposure guideline level. At a distance of 10m from the joint bays, the field contribution is predicted to reduce to less than 5mG, which is less than 0.3% of the relevant general public exposure guideline level.

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. For this reason, it is common practice when calculating fields from a feeder (where this is the dominant source), to calculate the field from the feeder and ignore other sources.

The predicted time weighted average magnetic fields at the nearest part of the residences from the feeders are not within the range of typical background levels. As such, exposure within the residences along the route will in many cases be dominated by existing sources within and around the home.

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 5-6.

Table 5-6: EMF mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Implement no cost and very low cost measures to reduce magnetic field exposure, including where relevant: • using a compact phase configuration (eg trefoil) • using multicore cables or trefoil single core cables • using optimum phase arrangement for dual circuits • balancing loads across phase.	✓	✓	
Using double circuit joint bays	✓	✓	
Within the carriageway locate feeders to minimise exposure as far as reasonably practicable (with potential increased temporary construction impacts).	✓	✓	
The feeder is to be installed following the route of existing 132kV feeders.	✓		✓

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
- the proposed mitigation measures are consistent with the prudent avoidance and precautionary policies and advice of the ENA, ARPANSA and WHO
- the predicted time weighted average magnetic field levels from the cables is less than 1mG for all residential buildings along the route
- the proposed feeder would generally be located within the alignment of existing 132kV feeders.

5.4 Noise and vibration

5.4.1 Existing environment

The normal day time noise and vibration environment near the proposed route is primarily influenced by traffic flows, local fauna, residential activity and nearby construction sites.

The existing environment is characterised by a mix of commercial, recreational areas and residential receivers.

Apart from residences potential sensitive receivers proximate to the route include a church, child care centres, high school, recreational areas and a community centre.

5.4.2 Potential impacts

Noise during construction

The Interim Construction Noise Guideline (ICNG) [12] 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.

The construction work required for this proposal would be highly transitory in nature. It is unlikely that construction works would occur for greater than a three week period in any given location. Thus a qualitative assessment is sufficient for this proposal. The ICNG makes provision for a qualitative assessment and this has been undertaken (refer to Appendix D).

The results of the qualitative assessment indicate that trenching and joint pit construction has the potential to have an adverse noise impact. To address the ICNG requirements, the appropriate noise practice would be to perform high noise activities during certain hours of the day when background noise is highest to minimise noise impact and potential for sleep disturbance. Pre-cast joint pits are to be utilised for joint bays which reduces the time for construction. Other construction equipment is unlikely to create significant noise impacts and consultation would occur throughout the construction phase to manage noise issues. Mitigation measures to address high noise

activities and hours of works will be covered in a site specific Construction Noise and Vibration Management Plan.

Vibration during construction

Any vibration impacts are anticipated to be less than one week in duration at any one location and as such, best management practice applies during the construction process. Designs indicate that excavation works will be more than 10m from structures for the duration works. Condition reports of structures are required within five metres of vibration generating works.

Noise and vibration during operation

Once operational, the feeders would not contribute any additional noise or vibration to the surrounding environment.

Impacts to the noise and vibration environment are likely to be associated with construction activities associated with the proposal and not during operation..

5.4.3 Environmental mitigation measures

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

Table 5-7: Noise and vibration mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 4.2 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.		✓	
Provide at least four clear business days notice but no more than 14 days 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) • 24 hour contact number.		✓	
Consult with affected sensitive receivers (eg schools, restaurants, hospitals, childcare, etc)		✓	
Schedule works outside worship times and during school holidays when in proximity to Picnic Point Public School.		✓	

Mitigation measures	Implementation of mitigation measures		
No high impact activities after 11 pm. (High impact activities include saw cutting, vibratory rolling, grinding, rock cutting, vibratory rolling, grinding, rock breaking, jack hammers, underboring/ directional drilling and impact piling).		✓	
Plan the site layout to minimise movements that would activate audible reversing and movement alarms.		✓	
Provide respite periods for affected receivers: • one hour respite after every three consecutive hours of high impact activities • one day respite after every three consecutive days of high impact activities. (High impact activities include saw cutting, vibratory rolling, grinding, rock cutting, vibratory rolling, grinding, rock breaking, jack hammers, underboring/ directional drilling and impact piling)		✓	
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) out of hours and/or night works may be required.		✓	
No work is permitted on Sunday night/ Monday morning unless fully justified as necessary due to unavoidable and exceptional circumstances.		✓	
Develop a Construction Noise and Vibration Management Plan (CNVMP) as part of the CEMP. The noise component must include but is not limited to joint bay works and out of hours works. The vibration component must include but is not limited to works within five metres of structures. Prior to any out of hours works commencing a site specific out of hours works procedure must be prepared and endorsed by Ausgrid's Environmental Services Unit and Community Relations Section. The CNVMP would take in to consideration the ICNG, OEH Assessing Vibration a Technical Guideline and Ausgrid's EG420 Construction Noise.	✓	✓	
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		

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
  • 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		✓	
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.		✓	
Locating the joint bays away from sensitive receivers where practicable.	✓	✓	
Refer operational noise enquires to Ausgrid Environmental Services.			✓

Mitigation measures	Implementation of mitigation measures		
Consider recessing road plates flush with the road surface when not in use for more than 2 nights.		✓	
Pre-cast joint bays are to be utilised to reduced timing of construction. If joint bay construction is take more than three weeks a quantitative noise assessment in accordance with the ICNG will be required at each location.	✓	✓	
Mains supply should be used at joint bays were practicable. Where required low noise generators should be used at joint bays and noise barriers or blankets used on temporary fence surrounding the joint bay.		✓	
Reinstate joint bays as soon as practicable so as to minimise the time that road plates are left in place.		✓	
Once installed pits lids must not rock and make noise. Impact absorbing material must be installed between pit lids to prevent noise nuisance as a result of joint pits.		✓	

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 transitory
- potential noise impacts would comply with the OEH ICNG
- potential noise impacts would comply with the NSW INP
- potential vibration impacts would comply with the OEH *Assessing Vibration: A Technical Guidelines* (2006)
- 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. The closest monitoring site to the proposal is at Chullora, approximately 8 km to the north off the study area.

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 emission of odours, smoke, fuel or any other substances to the air. There are many substances in the air which 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 prevalent weather conditions.

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

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 and to a lesser extent the operational phases. Given the nature of the works, it is unlikely that there would be an odour impact.

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, clearing vegetation, saw cutting, rock breaking and site preparation works. During construction the work site would be transitory in nature with the excavation and backfilling works progressing down the length of the trench. The exception to this would be the construction of joint pits.. During the operational phase if faults occur on the feeders a small work site would be established to excavate, uncover and repair the fault.

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'[13]. 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 2.2 of NS 174C Environmental Handbook.

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 5-8.

Table 5-8: 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		✓	

Mitigation measures	Implementation of mitigation measures		
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 and stockpiles, at material transfer points and during construction and demolition.		✓	
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.		✓	
Use dust collection devices (such as vacuum) on construction and rock breaking equipment where available.		✓	
Prepare and comply with a site specific erosion and sediment control plan (ESCP) when disturbing more than 250m^2 at any one time. The ESCP must be prepared in accordance with Managing Urban Stormwater – Soils and Construction (NSW Landcom, 2004), the 'Blue Book'. The ESCP will form part of the CEMP prepared prior to construction. The ESCP / soil and water management plan (SWMP) must be prepared by a suitably qualified person (ie who has completed an International Erosion Control Association (IECA) endorsed course or passed the examination for Certified Professional in Erosion and Sediment Control (CPESC)) in accordance with Managing Urban Stormwater – Soils and Construction.		✓	
No stockpiling on this site. 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.		✓	✓

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 impact on air quality
- 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 Yeramba Lagoon located 300 m to the west of the feeder within Georges River National Park. The Yeramba Lagoon drains into Georges River. Georges River flows east into Botany Bay.

According to City of Canterbury Bankstown mapping, the proposed route does not traverse land that is classified as flood prone.

A Geotechnical Investigation has been completed for the project by RCA Australia (Refer to Appendix E). At the time of fieldwork no groundwater was encountered in any of the 16 boreholes.

5.6.2 Potential impacts

Bulk earthworks would cause surface disturbance to the route during the initial phases of construction, creating potential for erosion and sedimentation of waterways. 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. A dewatering plan would be developed as part of the Construction Environmental Management Plan.

At the conclusion of earthworks all exposed soil surfaces would be stabilised. 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 within the Georges River National Park which is not within the riparian corridor as defined by the Guidelines for riparian corridors on waterfront land[14]. 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 and the natural topography constraints there would not be anticipated to be any impacts on the surrounding hydrological environment. In addition a re-vegetation plan would be developed to restore the area at the completion of works.

The proposal does not require an increase in hardstand areas or need to change topographic features, therefore local drainage flows would not be altered.

Groundwater is unlikely to be intercepted during excavation. The groundwater intercepted would require dewatering and a licence under the *Water Act 1912* or *Water Management Act 2000*. This licence would not be required during the operation of the proposal.

Water quality in the study area may be affected by spills of hydraulic oil and fuels from equipment 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.

The proposed works include the retirement of two existing fluid-filled 132kV feeders between TransGrid's Sydney South BSP and Revesby ZS. This will involve cutting, capping and making the cable safe; draining any free fluid from the cable and purging with nitrogen; and removal of any underground and aboveground fluid tanks.

As part of the Construction Environmental Management Plan (CEMP) prepared for the works a Fluid Filled Cable Decommissioning Plan will be required. This will assess the route for high risk (environment) locations and consider the need for additional works, such as installing additional drainage points. The Decommissioning Plan will detail the control measures required to be implemented during draining/purging to contain oil.

5.6.3 Environmental mitigation measures

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

Table 5-9: Hydrology quality mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with sections 2.1 Erosion and sediment control, 2.3 Oil fuel and chemicals and 2.2 Water discharge of NS174C Environmental Handbook.		✓	
All workers to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
Prior to construction, prepare and implement an ESCP/SWMP as part of the CEMP in accordance with the Blue Book. The ESCP/SWMP must be prepared by a suitably qualified person (i.e. who has completed an International Erosion Control Association (IECA) endorsed course or passed the examination for Certified Professional in Erosion and Sediment Control (CPESC)) in accordance with *Managing Urban Stormwater – Soils and Construction*. The ESCP/SWMP must address storage of spoil.		✓	
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		✓	✓
For maintenance, work in accordance with Erosion and sediment control on unsealed roads (OEH, 2012) and Managing Urban Stormwater Volume 2C Unsealed Roads.		✓	✓
Contain slurry using a wet-vac.		✓	
Organise a licensed taker to remove the water if the relevant discharge criteria cannot be met.		✓	✓
If dewatering of groundwater is required during construction, works would cease and additional testing would be undertaken to develop a Water Quality Management Plan.		✓	
If dewatering of groundwater is required during construction, obtain a licence under the *Water Act 1912* or *Water Management Act 2000* from NSW Office of Water.		✓	

Mitigation measures	Implementation of mitigation measures		
Prior to construction, prepare a re-vegetation management plan for works within Georges River National Park.		✓	✓
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.		✓	✓
Decommissioning of fluid filled cables and fluid tanks will be conducted in accordance with Fluid Filled Cable Decommissioning Plan developed as a part of the Construction Environmental Management Plan. Ongoing management of decommissioned cables in accordance with Ausgrid Procedures.		✓	✓

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 flood impacts would comply with the NSW Government *Floodplain Development Manual: the management of flood liable land* (2005)
- potential hydrology impacts would comply with the Blue Book
- mitigation measures outlined in section 0 would readily manage potential impacts.

5.7 Geology and soil

5.7.1 Existing environment

The Soil Landscape Series Sheet from the Soil Conservation Service of NSW Sydney Soil Landscape Series Sheet characterises the route's soil landscape groupings as:

- Lucas Height Landscape
- Blacktown Landscape
- Hawkesbury Landscape.

The Geological Series Sheet for Sydney characterises the route's geological groupings as:

- Hawkesbury Sandstone which is listed to comprise medium to course grained sandstone with very minor shale and laminate lenses
- Ashfield Shale which is listed to comprise black to dark grey shale and laminate

A specialist geotechnical assessment was carried out by RCA for the feeder route (Appendix E).

The topography of the landscape is relatively flat for most of the route with land generally sloping to the Sydney South BSP.

The proposed route is not within a mine subsidence area.

The Botany Bay Acid Sulfate Soil Risk Map published by the Department of Land and Water Conservation indicates that there is no known occurrence of acid sulfate soil materials in the area of the proposed feeder alignment. Acid Sulfate Soil testing was completed as part of the Geotechnical Investigation completed for the works (Refer to Appendix E). The investigation identified the potential for acid sulfate soils in proximity to the Revesby Zone Substation.

5.7.2 Potential impacts

The construction of the proposal would cause some minor soil instability. There would be more than 250 m^2 of soil disturbed at any one time, therefore an ESCP would be prepared prior to the commencement of works. During the operational phase if faults occur on the feeders a small worksite would be established to excavate, uncover and repair the fault. During operational phase work would comply with the erosion and sediment control measures detailed in NS 174C Environmental Handbook. The ESCP must be prepared by a suitably qualified person (i.e. who has completed an International Erosion Control Association (IECA) endorsed course or passed the examination for Certified Professional in Erosion and Sediment Control (CPESC)) in accordance with *Managing Urban Stormwater – Soils and Construction*[15].

5.7.3 Environmental mitigation measures

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

Table 5-10: 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 to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
Prepare and comply with a site specific erosion and sediment control plan (ESCP) when disturbing more than 250m^2 at any one time. The ESCP must be prepared in accordance with Managing Urban Stormwater – Soils and Construction (NSW Landcom, 2004), the 'Blue Book'. The ESCP will form part of the CEMP prepared prior to construction. The ESCP/SWMP must be prepared by a suitably qualified person (ie who has completed an International Erosion Control Association (IECA) endorsed course or passed the examination for Certified Professional in Erosion and Sediment Control (CPESC)) in accordance with *Managing Urban Stormwater – Soils and Construction*.	✓	✓	
Design 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.*	✓		✓

Mitigation measures	Implementation of mitigation measures		
Based on the presence of acidic residual soils and the exceedance of the action criteria determined by the Net Acidity value it is recommended that it would be prudent to allow for the preparation of an Acid Sulfate Management Plan (ASSMP) for all excavation works in the residual soils.	✓	✓	
Follow any instructions from the NPWS regarding access to weather-affected access tracks.		✓	✓
Restrict activities in land reserved under the NPW Act to periods of dry weather and to daylight hours.		✓	✓

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
- 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, recreational, commercial and conservation zoned areas and there are no sites listed on council or OEH's contaminated land register along the proposed route.

A Geotechnical Investigation was undertaken by RCA for the feeder route (Refer to Appendix E). The investigation was undertaken to provide an indicative assessment of the feeder route and comprised 9 waste classification samples. Natural material assessed by RCA is anticipated to be classified as general solid waste based on the testing undertaken. The Geotechnical Investigation identified one location where there was the potential for Acid Sulfate Soils.

There is the potential for the existing fluid-filled feeders and pilot cables 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.

5.8.2 Potential impacts

There is no evidence that the route is contaminated. The Geotechnical Investigation identified one location where there was the potential for Acid Sulfate Soils.

Additional trial hole investigations are to be undertaken by the Principal Contractor which would be used to ensure excavated spoil is appropriately classified and managed with respect to waste management requirements.

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 NS211 Working with Asbestos Products and DECC'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.

The removal of sections of fluid-filled feeders and fluid tanks and the draining and capping of the sections of feeders left in situ would result in a positive impact on the environment from the proposal by reducing the risk of future leaks.

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 DECC'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.

If unexpected contamination is identified during construction, the works would cease, access restricted and the Environmental Officer contacted to determine the nature and extent of the contamination.

5.8.3 Environmental mitigation measures

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

Table 5-11: Contamination mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 5.1 Contamination of NS174C Environmental Handbook.		✓	
All workers to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
Toolbox talk is to include a discussion of the potential contamination at the site.		✓	

Mitigation measures	Implementation of mitigation measures		
Segregate suspected contaminated spoil from clean spoil to reduce disposal costs.		✓	
Undertake testing to determine the 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 (there are exemptions for Ausgrid staff).		✓	
If you think that you have found contamination, you must stop work immediately, restrict access and notify: • your supervisor • Ausgrid's Environmental Services • 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.		✓	✓
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 if required.		✓	

Mitigation measures	Implementation of mitigation measures		
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) • 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 original depths. Soil excavated from the 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 DECC's Waste Classification Guidelines. The sampling must include OCPs.		✓	✓
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 soil from below the slab of existing 132kV cable trenches is not contaminated with anything other than OCP, reinstate it below the slab.		✓	✓
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 • arrange for classification of the soil dispose of the soil offsite in accordance with the classification		✓	✓

Mitigation measures	Implementation of mitigation measures		
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 DECC's Waste Classification Guidelines.		✓	✓
Additional trial hole investigations are to be undertaken by the Principal Contractor which would be used to ensure excavated spoil is appropriately classified and managed with respect to waste management requirements.	✓		

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 along the route / on the site
- the contamination would be managed in accordance with relevant OEH contamination guidelines
- mitigation measures outlined in section 5.8.3 would readily manage potential impacts.

5.9 Waste

5.9.1 Existing environment

A Geotechnical Investigation was undertaken by RCA for the feeder route (Refer to Appendix E). The investigation was undertaken to provide an indicative assessment of the feeder route and comprised 9 waste classification samples. Natural material assessed by RCA is anticipated to be classified as general solid waste based on the testing undertaken. The Geotechnical Investigation identified one location where there was the potential for Acid Sulfate Soils.

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:

- bitumen, concrete and asphalt as a result of removal of existing hard surfaces
- 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
- redundant equipment
- other general construction waste.

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

Additional trial hole investigations are to be undertaken by the Principal Contractor which would be used to ensure excavated spoil is appropriately classified and managed with respect to waste management requirements.

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).

During 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 5-12.

Table 5-12: Waste mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 5.3 Waste management of NS174C Environmental Handbook.		✓	
All workers to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	
Prior to construction, prepare a Waste Management Plan (WMP) which contains a list of expected wastes, their volume and their planned reuse, disposal or recycling.	✓	✓	
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.		✓	
Where possible, reuse or recycle or return to the supplier wastes including metal components, transformer oil, spoil and packaging.		✓	✓
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.		✓	
Ensure a spill kit is readily available and workers and know how to use it.		✓	
Segregate suspected contaminated spoil from clean spoil to reduce disposal costs.		✓	

Mitigation measures	Implementation of mitigation measures		
Undertake testing to determine the waste classification and subsequent storage, transport, tracking, licensing and disposal requirements.		✓	

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 majority off the feeder route will be within the roadway between the TransGrid Sydney South BSP and Revesby ZS. The area where the feeder route will travel through a vegetated area is within Georges River National Park.

The vegetation adjacent to the proposed feeder route within Georges River National park consists of Sydney Hinterland Exposed Sandstone Woodland occurring on shallow sandy loams on broad ridges associated with Mittagong sandstones or rocky exposed Hawkesbury Sandstone. This community is not listed on registers of the BC Act or EPBC Act. No threatened flora was noted on inspection and no threatened fauna is expected to be impacted.

An assessment of the existing flora and fauna environment was undertaken by consultants ACS Environmental Pty Ltd (Appendix F). The report indicated that the bushland community at both sites are not listed on either NSW Threatened Species Act (TSC Act 1995) or the Commonwealth Environmental Protection and Biodiversity Conservation Act (EPBC Act 1999) as an endangered ecological community (EEC).

A total of eleven threatened flora species and six fauna species have been recorded within 10km area around where vegetation management is required within the Georges River National Park.

Table 5-13 Threatened flora and fauna species recorded previously within 10km radius of project area (OEH 2017).

Common Name	Scientific Name	NSW Status	Comm. Status	No. of records
Flora				
	Hibbertia sp. Bankstown	E4A,P	CE	1
Woronora Beard-heath	*Leucopogon exolasius*	V,P	V	1

Common Name	Scientific Name	NSW Status	Comm. Status	No. of records
Prickly Bush-pea	*Pultenaea aristata*	V,P	V	1
Bynoe's Wattle	*Acacia bynoeana*	E1,P	V	1
Downy Wattle	*Acacia pubescens*	V,P	V	536
Deane's Paperbark	*Melaleuca deanei*	V,P	V	3
Sydney Plains Greenhood	*Pterostylis saxicola*	E1,P,2	E	1
Small-flower Grevillea	*Grevillea parviflora subsp. parviflora*	V,P	V	4
Hairy Geebung	*Persoonia hirsuta*	E1,P,3	E	2
Nodding Geebung	*Persoonia nutans*	E1,P	E	13
Spiked Rice-flower	*Pimelea spicata*	E1,P	E	1
Fauna				
Green and Golden Bell Frog	*Litoria aurea*	E1,P	V	2
Eastern Curlew	*Numenius madagascariensis*	P	CE,C,J,K	4
Swift Parrot	*Lathamus discolor*	E1,P,3	CE	5
Koala	*Phascolarctos cinereus*	V,P	V	26
Grey-headed Flying-fox	*Pteropus poliocephalus*	V,P	V	46
Large-eared Pied Bat	*Chalinolobus dwyeri*	V,P	V	4

None of the threatened flora species listed in Table above are located within the area of bushland proposed to be cleared or trimmed. Most of the threatened species have been recorded further to the north-west at Milperra and Hammondville and habitat is not considered suitable for most of these species.

The only threatened fauna species listed in the above table located close to the area of bushland proposed to be cleared or trimmed is the Grey-headed Flying Fox which feeds on the nectar of flowering eucalypts over wide range. This species will not be impacted by the proposal and nor would any of the other threatened fauna species.

5.10.2 Potential impacts

The proposal requires the removal of approximately 600 m^2 of regrowth vegetation to allow the installation of the replacement cables. The vegetation adjacent to the proposed feeder route within Georges River National park consists of Sydney Hinterland Exposed Sandstone Woodland occurring on shallow sandy loams on broad ridges associated with Mittagong sandstones or rocky exposed Hawkesbury Sandstone. This community is not listed on registers of the BC Act or EPBC Act. No threatened flora was noted on inspection and no threatened fauna is expected to be impacted. A number of mitigation measures were recommended and these are reproduced in section 5.10.3.

Through consultation with National Parks Ausgrid has been able to reduce the amount of vegetation requiring removal considerably by placing the cable route within the disturbed access track within Georges River National Park, which is outside the existing electrical infrastructure easement. There is mature vegetation growing above the existing easement which would have required clearing had Ausgrid followed the route of the existing infrastructure.

Noise impacts

While the construction phases of the proposal (along with its ancillary activities) may cause temporary disturbance to animals, the impacts from noise emissions are likely to be localised close to the proposal (up to 100 m) and are not likely to have a significant, long-term, impact on wildlife populations.

Fragmentation and connectivity

Habitat fragmentation through the clearing of vegetation can increase the isolation of remnant vegetation and create barriers to the movements of small and sedentary fauna such as ground dwelling mammals, reptiles, amphibians and small birds. Furthermore habitat fragmentation can create barriers to the movement of pollinator vectors, such as insects, and thereby affecting the life cycle of both common and threatened flora.

Construction of the proposal predominantly within in the existing cleared access track within Georges River National Park would not result in additional fragmentation or any edge effects. Outside the National Park the cables will be installed within existing roadways.

Weeds

The spread of weeds through the study area may occur regardless of which route is chosen for the proposal. The proposal has the potential to further disperse weeds into areas of bushland within the study area, particularly adjacent to cleared areas.

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. Existing disturbed vegetation within the study area, has considerable weed growth already, therefore the overall extent of weed invasion is not likely to increase significantly.

5.10.3 Environmental mitigation measures

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

Table 5-14: Flora and fauna mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 6 Ecology of NS174C Environmental Handbook.		✓	
All workers to be made aware of the presence of sensitive areas and the need to avoid impacts.		✓	

Mitigation measures	Implementation of mitigation measures		
Where cables must be laid within the TPZ, minimise the extent impacted and for significant encroachments, underbore/ directional drill at least 600 mm beneath the ground surface, or if excavating, hand dig or use an air knife.		✓	
Keep storage areas, stockpiles, vehicle parking, and access tracks clear of the TPZ.		✓	✓
Before entering or leaving bushland, check boots, personal items and all components of vehicles and equipment (including radiator, engine, cabin, tray, attachments, guards and plates) are free of soil and vegetation. If identified, disinfected with solutions such as Pine-o-Cleen or Nu Clenz prior to undertaking works in vulnerable areas.		✓	✓
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.		✓	
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.		✓	
When removing weeds, select the most appropriate method taking in to account weed species, environmental considerations and the extent of infestation. Use of pesticides will comply with the Pesticides Act 1999.		✓	✓
Contain and dispose of cleared vegetation containing weeds to an appropriately licensed vegetation waste disposal facility.		✓	✓

Mitigation measures	Implementation of mitigation measures		
For unplanned encroachments within the TPZ: 1. Prior to site establishment, prepare a TPZ and SRZ plan to show TPZ and SRZ limits and trench alignment. 2. Prior to site establishment, mark out TPZ limits in the field where access allows using spray paint. 3. Prior to site establishment, include the SRZ / TPZ plan in relevant work instructions. 4. Prior to construction, provide the SRZ / TPZ plan to the appropriate contact person (council, land owner, park manager) advising they would be notified where any un-planned works would encroach on the TPZ. 5. Provide tool box construction restrictions and approval process for works within the SRZ / TPZ to construction crews. 6. Generate a hold point where the SRZ is to be compromised via construction works (trenching, access or storage of materials), until written advice is received from an arborist that planned controls are sufficient to release the hold point.		✓	
Contact local wildlife rescue organisations for the rescue or care of native wildlife (refer to section 11 of NS174C Environmental Handbook)		✓	✓
If planting vegetation, use local native species grown from local provenance seed. These can be purchased from many council nurseries and a number of private native nurseries.		✓	
Keep to designated roads and access tracks. Restrict vehicle and plant movements to existing cleared areas.		✓	
Implement a tree felling protocol to protect fauna. 1. Identify all hollow-bearing trees in the vicinity of the works with high visibility flag or similar prior to commencement of vegetation clearing. 2. Undertake pre-clearance surveys for fauna immediately prior to clearing. 3. Where fauna is identified in a tree to be felled, the tree must not be cleared until the fauna has relocated itself. 4. Remove understorey vegetation and other trees in the vicinity. 5. Check the tree each morning until the fauna moves into adjacent vegetation (normally following day). 6. Ensure an ecologist is present during felling of hollow-bearing trees to relocate fauna or provide care as necessary.		✓	
No importing mulch from other sites.		✓	✓

Mitigation measures	Implementation of mitigation measures		
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 SRZ / TPZ.	✓	✓	
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.		✓	
Comply with conditions / recommendations in Appendix F Ecological Report.		✓	
A vegetation rehabilitation plan must be developed for the section where regrowth vegetation is to be removed in co-ordination with National Parks and local community groups	✓	✓	

5.10.4 Conclusion

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

- potential impacts to flora and fauna from the proposal have largely been avoided through the route selection
- No threatened flora or fauna species, or threatened ecological communities, were noted to occur, or have the potential to occur, along the route of the new trenched 132kV feeder.
- 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 within land mapped as a bush fire category 1, 2 and Buffer under the Canterbury Bankstown Council bush fire prone land maps Figure 5-1 indicates the location of bushfire prone areas on the feeder route.

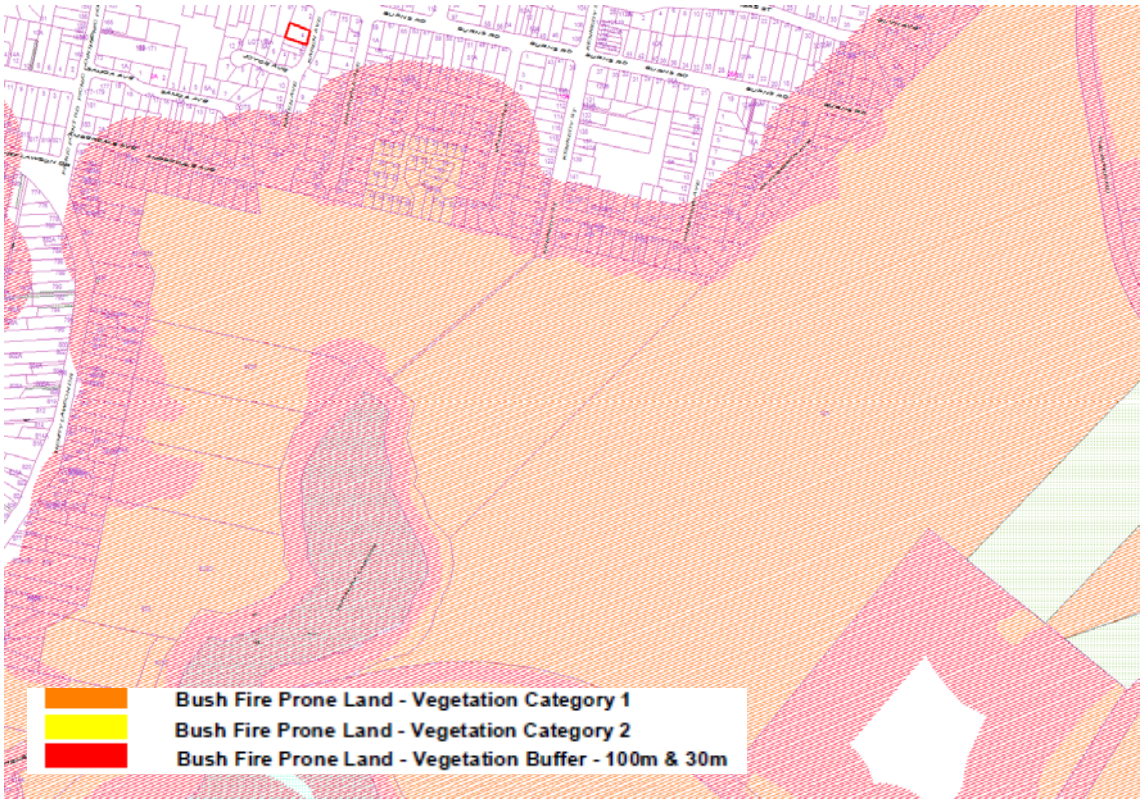

Figure 5-1 Bushfire Prone Land on feeder route

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
- use of machinery with the potential to generate sparks, such as jack hammers, rock saws, 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..

5.11.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-15.

Table 5-15: 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.		✓	
All workers to be made aware of sensitive areas and the need to avoid impacts.		✓	
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.		✓	✓

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
- the proposal has been designed in accordance with the NSW RFS *Planning for Bush Fire Protection* [16], the BCA and *AS 3959 Construction of buildings in bushfire-prone areas*[17]
- 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 predominantly developed land that has previously been disturbed. Previous disturbance has occurred over the majority of the route as a result of construction of roads, construction of buildings and structures, installation of utilities, clearing of vegetation and earthworks and modification of the ground surface is clear and observable. The geotechnical investigation indicated that there is a fill layer present in the surface layer.

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

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 site or objects have previously been recorded in

proximity to the proposal site. The nearest recorded Aboriginal artefact is located 400 m north east of the proposal.

5.12.2 Potential impacts

The proposal would not impact on any known Aboriginal object. The proposal does involve clearing vegetation and disturbing the ground surface in areas previously disturbed, however 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) was not required.

5.12.3 Environmental mitigation measures

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

Table 5-16: Aboriginal heritage mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Comply with section 7.1 Aboriginal heritage of NS174C Environmental Handbook.		✓	
All workers to be made aware of sensitive areas and the need to avoid impacts.		✓	
IMPORTANT: THIS PROPOSAL IS ON DISTURBED LAND. If you think you have discovered an Aboriginal heritage object or evidence of Aboriginal occupation you must stop work immediately, restrict access and notify your Supervisor to ensure the regulator is contacted. Ausgrid employees should contact Ausgrid's Environmental Services. In these cases Ausgrid's Environmental Services will contact the regulator.		✓	✓

Mitigation measures	Implementation of mitigation measures		
No impact on rock outcrops		✓	
Restrict vehicle and plant movements to existing roadways or access tracks.		✓	

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 along the route
- the proposal would not impact any known Aboriginal sites
- 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[18], NSW State Heritage Inventory[19] and the Bankstown Local Environmental Plan. The results of these searches were that there are no Commonwealth or State or Local Heritage listed items in the study area. Potential impacts

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

5.13.2 Environmental mitigation measures

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

Table 5-17: 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 works to cease if potential heritage is discovered. Access should be restricted and Supervisor notified to ensure regulator is contacted. Ausgrid employees should contact Ausgrid Environmental Services on 9394 6659.		✓	

5.13.3 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 along the route
- the proposal would not affect known non-Aboriginal heritage items
- mitigation measures outlined in section 5.13.2 would readily manage potential impacts.

5.14 Visual and aesthetics

5.14.1 Existing environment

The existing visual environment of the proposed route consists of:

- urban, commercial, bushland, parkland or other open space
- traditional building character
- existing infrastructure in the area

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:

- limited vegetation clearing , minimised through the use of existing cleared areas for the majority of the route
- short term construction activities.

The proposal would be visible from residents and road users.

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 potential for the removal of trees. The impact would vary throughout construction, with the trenching 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.

Removal of vegetation within Georges River National Park would result in a short term impact. Once the feeder is installed in this area a rehabilitation plan would be implemented to ensure the area is stable and that native vegetation regenerates.

Long term visual impact

There would be no long term visual impacts from the actual feeders as they would be installed underground and the roadways would be suitably reinstated post works. There is the potential for minor long term visual impacts due to the removal of a limited amount of regrowth vegetation if the excavation works are deemed to be in the TPZ or APZ and also within Georges River National Park. This would be mitigated by

undertaking replacement planting in consultation with the Georges River National Park and the local community group.

Once constructed, the proposal would not restrict access to recreational space, commercial or industrial development or residential development. The proposal would require minimal maintenance, reducing the need for plant and equipment to access the route.

5.14.3 Environmental mitigation measures

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

Table 5-18: Visual mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Consult with affected stakeholders about the proposal.	✓	✓	
The feeders would be installed underground.	✓		
Reinstate the roadways post works to a suitable condition.		✓	
Clear the minimum amount of vegetation necessary and undertake replacement planting.		✓	
Locate the proposal within the existing easement that contains existing electrical infrastructure within Georges River National Park or within the existing cleared access track where possible.	✓		

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 feeders would be installed underground
- the minimum amount of vegetation would be cleared as possible and replacement planting would be undertaken in consultation with Georges River National Park and local community groups
- the proposed would be generally located within the pre-disturbed areas
- mitigation measures outlined in section 5.14.3 would readily manage potential impacts.

5.15 Traffic and access

5.15.1 Existing environment

The main features of the transport network in the area of the proposal include roadways and pedestrian paths. Transport in the region is heavily reliant on the road network for private vehicle usage and public transport in the form of buses and commercial vehicles. Any impacts on the road network in the region are quickly amplified with the high volumes of traffic which utilise the road network daily.

Community consultation has indicated that Tower St and Kennedy St have the highest traffic flows on the route. The works will only involve a crossing of Tower St and the width of Kennedy St will allow two lanes of traffic to operate in most locations, and in some will operate via a stop/go arrangement.

There is one NSW Roads and Maritime Service Classified roads located along the proposed route.

Throughout the feeder route, both sides of the road are utilised for car parking during business hours and also out of hours due to residential properties. Due to the widths of the road the impacts on parking should be able to be minimised. Paved footpaths are located throughout the route.

5.15.2 Potential impacts

The proposal involves crossing Tower St, which is a classified road. The RMS would be consulted and necessary approvals gained prior to construction.

During construction approximately up to 30 vehicles would be required on the route at any one time. Vehicles associated with the proposal would mainly include light vehicles and one to two heavier vehicles such as excavators and trucks. Heavy vehicles along the route 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 partially or fully closed and access may change or be reduced to some buildings for short periods of time.

There would be disruption to bus routes during construction of the feeder. Temporary alteration in bus stops will also be required. Continuous consultation with bus service providers will be required throughout the project.

Extended impacts on roadways would occur at joint bay locations. Construction of the bays would take an estimated two to three weeks to complete at each site. An enclosure would be installed at each joint bay during the installation of feeders to protect the feeders from environmental elements. This may require partial or complete closure of the road whilst the enclosure was in place.

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*[20] and would be implemented during construction. The TMP would also include allocated areas for staff parking.

A traffic control plan (TCP) which 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 route 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 5-19.

Table 5-19: 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.		✓	
Where works are proposed on a classified road, consent is required under section 138(1) of the Roads Act 1993. To apply for a section 138 consent, write to RMS for classified state roads or the relevant local council for classified regional roads to request approval, providing a description of the work and including a plan showing the extent of the works. Ausgrid employees should use the relevant templates from Appendix 1 of Ausgrid's Procedure to Seek Consent Under Section 138 of the Roads Act. An ROL must be obtained from RMS if traffic will be impacted during the works. Where works are in local roads council must be contacted regarding road opening approvals.		✓	
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.		✓	
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 (egg their access will be restricted), one week's notice must be given.		✓	
Reinstate roads post works in consultation with council/RMS.		✓	
Enclosures would only be installed a maximum two weeks prior to the commencement of jointing	✓		
Where multiple works crews are being utilised there would be adequate separation to minimise impacts on traffic		✓	

Mitigation measures	Implementation of mitigation measures		
Temporary joint pit lids would be installed to reduce the potential for noise from impacting each other. Once installed pits lids shall not rock and make noise. Impact absorbing material must be installed between pit lids to prevent noise nuisance as a result of joint pits.		✓	
If there are considerable delays in joint bay works temporary reinstatement of joint bays will be considered to reduce traffic and noise impacts.		✓	
Installation of Variable Message Signs prior to the commencement of works to alert road users of future closures/work areas.	✓	✓	
Consult with Sydney Buses regarding impacts to routes and bus stop locations	✓	✓	

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 Tower St 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
- 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 suburbs of Revesby, Panania and Picnic Point within the Canterbury-Bankstown LGA. Land use within the area is characterised by a mix of residential, recreational, commercial and conservation.

5.16.2 Potential impact

The existing feeders being replaced are reaching the end of their serviceable lives and their replacement has become necessary for Ausgrid to ensure a reliable supply is available to homes and other buildings. 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.

During the consultative process, as detailed in section 2, the community expressed concern over the social consequences resulting from the selection of a route that travels through the community. These concerns included, stress and anxiety in relation to the potential health effects related to EMF, traffic and parking, road restoration, access during construction and impacts on vegetation. The issues associated with EMF, noise, visual aesthetics and traffic have been assessed in detail in this REF.

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

5.16.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-20.

Table 5-20: 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
- 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 (refer to section 1.4). No other Ausgrid activities with potentially cumulative impacts are currently underway.

No other non-Ausgrid activities with potentially cumulative impacts are currently underway. 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 5-21.

Table 5-21: Summary of cumulative impacts

Potential impact	Other activities with cumulative impacts	Contribution to overall impact	REF section
Noise	• Vehicles and machinery associated with other construction works; • Traffic noise; • Installation of utilities; • Other land development projects • Vehicles and machinery associated with other Ausgrid construction works	Council was consulted in relation to other development in the area. Council submissions and community feedback have been given due consideration (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 132 kV, 11 kV and 415 V power lines. Existing 132 kV, 11 kV substations.	Cumulative impacts associated with EMF are specifically discussed in section 5.3.	5.3
Traffic	• Other vehicle, bicycle and pedestrian traffic • Vehicles and machinery associated with other construction works • Installation of utilities; • Vehicles and machinery associated with other Ausgrid construction works	Impacts to vehicle and pedestrian traffic during the works. 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 traffic movements. Other works on Ausgrid's network would be staged and coordinated as necessary to minimise potential cumulative traffic impacts on vehicle/pedestrian movements during the construction of the proposal.	5.15

Potential impact	Other activities with cumulative impacts	Contribution to overall impact	REF section
Resources	Materials as listed in section 1.8.11 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

5.17.2 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 5-22.

Table 5-22: Cumulative impacts mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
The proposal would be constructed in stages along the proposed route, thereby limiting the amount of noise at any one time and phasing out the various construction scenarios by distance and time.		✓	
Ausgrid is proposing a number of mitigation measures (outlined in section 5.3) which will substantially reduce the magnetic field exposure.	✓	✓	✓
The appropriate road authority must be consulted during the TMP process for any necessary approvals.	✓	✓	
Canterbury-Bankstown Council, any adjacent commercial premises and sensitive receivers would be consulted prior to construction in order to minimise cumulative traffic and noise impacts associated with the works.	✓	✓	
Other works on Ausgrid's network would be staged and coordinated as necessary to minimise potential cumulative traffic and noise impacts during the construction of the proposal.	✓	✓	
Mitigation measures to address cumulative impact are detailed in sections 5.3, 5.4, 5.8, 5.9 and 5.15 of this REF.	✓	✓	✓

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
- mitigation measures outlined in section 5.17.2 would readily manage potential impacts.

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
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	1.8.11 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[21].

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.	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. 4(1) 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".[22]

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 range of specialist environmental investigations, including Waste Classification, Ecological and EMF have 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.

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 summary of the individual impacts for the proposal is presented in Table 7-1.

Table 7-1: Summary of impacts

Issue	Comment	Likely impact
Land use	No land use would be potentially affected by the proposal.	Minor
Climate change	The proposal considers sea level rise and flood prone land and the siting of infrastructure complies with all relevant Network Standards.	Nil
Electric and magnetic fields	EMF levels are within the ICNIRP 2010 Public Reference Levels and there are no further ways to reduce exposure consistent with prudent avoidance (i.e. very low cost and without unduly compromise other issues).	Nil
Noise and vibration	The proposal would not involve out of hours work without meeting the notification/respite requirements as outlined in this assessment. Potential impacts would be appropriately managed with the specific construction controls. The proposal would not exceed the operational criteria.	Minor
Air quality	The proposal would not involve dust leaving the worksite and would not generate offensive odours/fumes.	Minor
Hydrology	The proposal would not involve handling, storing, transporting or disposing of oils, fuels, chemicals or dangerous goods including oil filled equipment. The proposal may involve discharges of accumulated water, however, potential impacts would be appropriately managed with the specific construction controls. There will be no groundwater extraction.	Minor
Geology and soil	The proposal would not involve sediment leaving the worksite . Potential impacts would be appropriately managed with the specific construction controls.	Minor
Contamination	No contamination would be potentially affected by the proposal. The proposal will not result in the contamination of soil, surface or groundwater.	Nil
Waste	Waste generated by the proposal would be classified, handled, transported, stored, tracked and disposed in accordance with relevant guidelines, procedures and existing licences.	Nil

Issue	Comment	Likely impact
Flora and fauna	No threatened species, populations or ecological communities listed within Commonwealth (or State) legislation would be potentially affected by the proposal. A vegetation rehabilitation plan must be developed for the area requiring vegetation management within Georges River National park in co-ordination with National Parks and local community groups.	Minor
Bush fire	The proposal is within bushfire prone land and would comply with: • Hot works requirements in DG 33B Hotworks and total fire bans. Potential impacts would be appropriately managed with the specific construction controls.	Nil
Aboriginal heritage	There is no known Aboriginal heritage in the area of the works (as identified by WebGIS and other means).	Nil
Non-Aboriginal heritage	There are no non aboriginal heritage items (world, national, state, local, S170, archaeological areas) in the area (as identified by WebGIS and other means).	Nil
Visual and aesthetics	The proposal has considered all aesthetic, scenic, natural or recreational values and there is no unreasonable impact to these areas. All reasonable ways to further reduce visual impacts have been considered. The proposal would not involve any new structures >13m within areas mapped as SEPP 71 coastal protection.	Nil
Traffic and access	Works on a classified road would comply with the relevant RMS approval and road occupancy licence (ROL) requirements. No other significant access corridors would be restricted. Affected residences and businesses would be consulted about the schedule of work. The proposal would not prevent access or mobility for people with disabilities.	Minor
Social and economic	Minor social and economic issues would potentially arise from the construction activities in roadways.	Minor
Cumulative impact	Cumulative impacts from other projects/proposals within the area would be effectively managed with the specific construction controls. At the time of preparation of this assessment Ausgrid was not aware of any other projects that would cause cumulative impacts.	Nil

A number of potential environmental impacts from the proposal have been avoided or reduced during the design development and options assessment.

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
- 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
- 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*[23].

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 1.6) 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
- 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[24] 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.

8.2 Operation environmental management plan

Ausgrid network standards, operating procedures and environmental guidelines will be sufficient to fulfil the requirements of an OEMP for this proposal.

8.3 Environmental mitigation measures

Mitigation measures for all phases of the proposal are summarised in Table 8-1: Implementation mitigation measures.

Table 8-1: Implementation mitigation measures

Mitigation measures	Implementation of mitigation measures		
	Design	Construction	Operation
Prepare CEMP.		✓	
Review CEMP for adequacy by Ausgrid		✓	
At the conclusion of the construction phase of the proposal, [Ausgrid / the Contractor] must record how and whether the conditions and measures in the REF and CEMP were observed.		✓	

Additionally, through the outcomes of the auditing process, Ausgrid will also generally implement as part of its broader processes any learnings which are identified through the auditing process in order to ensure its continuous improvement for future proposals.

9 Certification

The Picnic Point to Revesby Cable Project REF assesses the potential impacts of the proposal to construct, operate and maintain two 132kV sub-transmission feeders between TransGrid's Sydney South Bulk Supply Point (BSP) in Picnic Point and Ausgrid's Revesby Zone Substation (ZS) in Revesby. The feeder route traverses through the Canterbury-Bankstown local government area (LGA).

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 1.6. This REF fulfils the requirements of section 111 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: Matt Gencur

Title: Environmental Operations Officer

Company: Ausgrid

Date: 31/10/2018

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: Leslie McCluskey

Title: Senior Environmental Officer

Company: Ausgrid

Date: 31/10/2018

Project manager acceptance:

I accept the description of the proposal outlined in section 1.6 as true and accurate and I commit to the implementation of the mitigation measures outlined in section 5.

Signature:

Name: Allan Ghadban

Title: Project Manager

Company: Ausgrid

Date: 31/10/2018

Appendix A Drawings and plans

Appendix B Consultation Documentation

Appendix C Magnetic Field Assessment

Appendix D Qualitative noise assessment

Proposal name	Picnic Point and Revesby Cable Project
Proposal no.	REF - 328 NIG - 13230 WBS – SJ-00287/SI-00327
Proposal details	Installing underground 132kV feeders between TransGrid's Sydney South Bulk Supply Point (BSP) in Picnic Point and Ausgrid's Revesby Zone Substation (ZS) in Revesby. The proposed route is 3.3km and is expected to take 12 months to complete the trench excavations. Work would require trenching to install conduit, installation of cable, jointing activities and reinstatement of roadway at the completion of works. The construction route is required to cross Tower St which is a RMS classified roads.
Step 1 – Determine if any sensitive receivers would be affected by the work	Works would pass residential properties along the route. Mixed commercial properties exist along the route, café and shop fronts.
Step 2 – Determine the work hours	Majority of works would be undertaken during Standard Work Hours, • *Monday to Friday 7am to 6pm* • *Saturday 8am to 1pm* Crossing of Tower St would be under RMS Road Occupancy Licence (ROL). This work would be undertaken at night (9pm – 4am) and require 4 nights work to complete.
Step 3 – Identify noisy works	The following equipment would be used during construction • *Standard Equipment* • *Excavator* • *Generator* • *Concrete Truck* • *High Impact Equipment* • *Saw cutting* • *Jackhammer* • *Truck* • *Cable Winch* • *'Wacker'*
Step 4 – Employ work practices to manage noise levels	Apply the following controls for all construction works: • *Saw cutter and jack hammer used only between 8am-12am and 2pm-6pm.* • *Turn off idling equipment when not used for extended periods.* • *Alternative rock-breaking methods such as hydraulic splitters and rippers are to be used when practicable.* • *All tracked machinery to be fitted with rubber treads/tires instead of metal tracks.* • *Selection of lower noise Hire Machinery where available to achieve work requirements.* • *Select insulated or 'silenced' compressors and generators when hiring equipment.* Additional controls for night works: • *Night works would occur for two consecutive nights and followed with one night respite, e.g. four nights work with one night respite in a one week period.* • *Saw cutting to be undertaken during normal hours if possible. If night works then must be completed before 11pm.* • *The construction site would be laid out as a drive through site to limit the need for reversing.* • *All plant onsite would be fitted with broad band reversing alarms.*
Step 5 – Notify and consult the community	*Standard notification to be provided to receivers along proposal route, 48hrs notification prior to the commencement of works.* *Early notification to be provided to resident affected by night works on Hume Highway, 5 days prior to the commencement of works.*
Step 6 – Implement a complaints handling procedure	Contractor undertaking works to provide a 24hr contact number during works. Contact number must be provided on the following: • *on all community notification letters* • *clearly displayed at all times on the construction site fence*

Appendix E Geotechnical Investigation Report

Appendix F Ecological Assessment

Appendix G Approval and Determination Notice for works in Georges River National Park

References

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[23] Department of Infrastructure, Planning and Natural Resources (DIPNR), *Guideline for the Preparation of Environmental Management Plans*, 2004, <www.planning.nsw.gov.au/rdaguidelines/documents/emp_guideline_publication_october.pdf>

[24] ISO, *ISO 14001:2015 Environmental management systems - Requirements with guidance for use,* 2004.