

7.9. Traffic and Access

7.9.1. Existing Environment

The proposed substation site is located in the south-western corner of Hyland Road Park and would be accessed via Hyland Road. Hyland Road has two traffic lanes and two parking lanes with access to the proposed substation site gained from two points. The main access point would be at the western end of Hyland Road and another ancillary access point is available to the north.

The north-south portion of Hyland Road ends in a cul-de-sac, with a short, single lane bitumen section leading to a lockable gate for the Hyland Road Rifle Range and Pigeon Club share facilities. As noted in **Section 4.2.2** these facilities would be relocated for the proposed substation development. **Figure 4-1** provides the proposed site layout plan including access points into the site.

Existing traffic movements on Hyland Road are minimal and mainly comprise vehicles accessing 1, 3 and 5 Hyland Road as well as vehicles accessing the Hyland Road Youth Centre and the Hyland Road Rifle Range and Pigeon Club share facilities. On-site parking at the Hyland Road Youth Centre is limited hence users may be required to park on Hyland Road. The Hyland Road Rifle Range and Pigeon Club share facilities would be relocated to the north of the proposed substation site and parking for these facilities would be provided onsite.

A public cycleway and pedestrian path is located on the western side of Hyland Road, which connects the Boral Greystanes Estate Precinct to parklands located to the south of the proposed substation site.

7.9.2. Potential Impacts

Potential traffic and access impacts associated with construction and operation of the proposed substation are described below.

Construction

During the construction phase there would be approximately 30 vehicle movements per day as well as variable heavy vehicle movements. The main generation of traffic during the construction phase would be due to the delivery of materials and equipment as well as the removal of waste. As noted in **Section 5.3**, the north-south portion of Hyland Road which ends in a cul-de-sac may need to be widened north of the cul-de-sac down to the major access to accommodate transformer deliveries. **Figure 4-1** shows the general location of any road widening works. It should be noted that the requirement for road widening works would be determined following a vehicle turning analysis to check whether these heavy vehicles can enter and exit the proposed substation site in a forwards direction.

Hyland Road would provide suitable access for all other deliveries of plant and equipment required for the construction phase. Minor modifications to the fencing and gates at the main entry on Hyland Road would be required to provide adequate access to heavy vehicles during the construction phase. The proposed substation Contractor would be required to prepare a Traffic Management Plan (TMP) for the construction phase to detail access arrangements.

As discussed in **Section 5.3**, should the widening of Hyland Road be required for the transport of transformers, this would comprise works on a public road. Hence approval would be required from the Holroyd City Council under Section 138 of the *Roads Act 1993*. As noted in **Section 4.2.1**, the transformer Contractor would also be required to consult with the RTA regarding the movement of transformers to the proposed substation site to avoid impacts on local traffic, high pressure mains and surrounding sensitive receivers. The TMP prepared by the transformer Contractor for the delivery of transformers would detail the requirements for consultation with the surrounding sensitive receivers and relevant authorities. The transformers would be delivered from Port Kembla in Wollongong or Port Botany in Sydney.

The traffic and associated noise generated by the additional light and heavy vehicle movements during the construction phase is likely to be apparent to residents at 1, 3 and 5 Hyland Road as well as the Hyland Road Youth Centre and potentially the Hyland Road Rifle Range and Pigeon Club share facilities.

Parking for residents and users of the Hyland Road Youth Club and Hyland Road Rifle Range and Pigeon Club share facilities on Hyland Road would be reduced during the construction phase due to the movement of heavy vehicles and transformers. Use of the public cycleway/pedestrian path on the western side of Hyland Road may also be limited should the widening of Hyland Road be required. Parking for construction personnel would be provided within the boundaries of the proposed substation site.

Operation

During the operational phase of the proposed substation, inspections and maintenance activities would be required approximately once a month or on an as needs basis. Maintenance activities would require a maximum of three light vehicles to access the proposed substation site which would have no impacts on traffic and parking on Hyland Road. Access to the proposed substation site would be gained from the main entrance on the western end of Hyland Road, Parking for maintenance personnel would be provided entirely within the boundaries of the proposed substation site.

7.9.3. Mitigation Measures

Recommendations for the management of traffic and access during construction and operation of the proposed substation are outlined below:

Construction

- A TMP would be prepared by the proposed substation Contractor to manage traffic, parking and potential cycleway/pedestrian path closures generated by the construction phase of the proposed substation. Mitigation measures in the TMP would include:
 - Time and load restrictions on construction vehicles and trucks entering and leaving the work site;
 - Measures to protect Holroyd City Council foot paving, kerbing and guttering;

- Designated parking areas within the boundaries of the proposed substation site to minimise disruption to other road users and the public on Hyland Road and the adjacent cycleway/pedestrian path;
 - Consultation measures to advise residents at 1, 3 and 5 Hyland Road as well as users of the Hyland Road Youth Club Hyland Road Rifle Range and Pigeon Club share facilities of any road closures or disruption to access or parking during the construction phase;
 - A vehicle turning analysis to determine whether road widening works would be required on Hyland Road; and
 - Pedestrian management (including the management of cyclists).
- The transformer Contractor would consult with the RTA to determine the appropriate transport route for the transformer deliveries and would prepare a TMP to outline measures to reduce potential impacts on traffic associated with transporting the transformers to the proposed substation site;
 - Approval from the Holroyd City Council under Section 138 of the *Roads Act 1993* would be sought for any works on Hyland Road, which is classed as a local road;
 - If required, repairs would be made to kerbs, gutters and asphalt pavement along Hyland Road following delivery of transformers;
 - If required, a dilapidation survey and restoration of road and pavements would be undertaken along Hyland Road; and
 - If road widening works are necessary along Hyland Road it would be reinstated to its original alignment following the delivery of transformers.

Operation

During the operational phase of the proposed substation traffic generation would be minimal and affects on Hyland Road would be negligible. Mitigation measures would not be required.

7.10. Air Quality

7.10.1. Existing Environment

Sensitive Receivers

The term sensitive receiver in relation to air quality refers to all nearby receivers that may potentially be affected by air emissions both now and in the future. Sensitive receivers within the vicinity of the proposed substation site would include:

- Hyland Road Youth Centre which is located directly adjacent to the north-west of the proposed substation site;
- Residential dwellings at 1, 3 and 5 Hyland Road located approximately 400 metres to the north-east of the proposed substation site; and
- The future residents of the Boral Greystanes Estate Precinct located approximately 200 metres to the north of the proposed substation site.

Climate

Climate data for the proposed substation site was obtained from the Bureau of Meteorology (BOM) weather station at Prospect Dam, located approximately two kilometres north-west of the proposed substation site. Climate at the proposed substation site and surrounds is generally temperate and typically experiences mild to hot summers and cool winters with a mean annual temperatures of 23°C in January and 12.2°C in July.

Wind speed and direction is also recorded at the Prospect Dam weather station. South-west winds at the Prospect Dam weather station are dominant at both 9.00am and 3.00pm. There are also influences of south-east and north-east winds at 3.00pm.

Air Quality

Air quality in the Holroyd LGA is a concern to the Holroyd City Council and its community (Holroyd City Council 2009). While no regular air quality monitoring has been undertaken within the Holroyd LGA, the Holroyd City Council indicates that the main factors affecting air quality include:

- Motor vehicle and transport emissions;
- Urban development (including domestic woodfire heaters); and
- Industrial air pollution.

7.10.2. Potential Impacts

Potential air quality impacts associated with construction and operation of the proposed substation are described below.

Construction

The main impact on air quality during the construction phase of the proposed substation would include the generation of dust. Fugitive dust sources during the construction phase would include vehicle and plant movements and wind erosion from unsealed surfaces, stockpiles, earthworks and from areas cleared of groundcover and topsoil. Dust generated during earthworks would have a minor effect on air quality during construction. The nearest residential receiver is a dwelling on Hyland Road located approximately 450 metres north-east of the proposed substation site. Any dust emissions when the prevailing wind direction is from the south-west would travel in this direction. The implementation of mitigation measures for dust suppression and the maintenance of the dust control procedures would strive to ensure that fugitive dust emissions from the proposed construction works would be minimal.

Operation

Sulfur hexafluoride gas (SF₆) would be used to insulate the switchgear at the proposed substation. Specifically, SF₆ would be found within the circuit breakers and other switchgear including high-voltage transformers, switches, capacitors and coaxial cables. SF₆ is identified as a Class 2.2 Non-Flammable and Non-Toxic gas under the Australian Dangerous Goods Code. However, despite this non-flammable and non-toxic recognition, the concentration of SF₆ gas could lead to the exclusion of oxygen due to its significantly higher molecular weight, leading to the subsequent development of an asphyxiant concentration in a confined area.

SF6 has the potential to contribute to Greenhouse Gas (GHG) emissions. This is indicated by its high GHG equivalence of 23,900 times carbon dioxide. SF6 is sealed within gas-tight compartments inside the switchgear however leakage can occur during maintenance activities or through poor work practices.

7.10.3. Mitigation Measures

Recommendations for the management of air quality during construction and operation of the proposed substation are outlined below.

Construction

- Suitable controls would be implemented for stockpiles and unsealed construction areas that are exposed for more than 24 hours, such as covering or spraying with water;
- Construction vehicles would be restricted to stabilised or sealed ground surfaces as far as practicable to reduce dust generation and sediment tracking on local roads;
- Appropriate vehicle speed limits would be established and enforced to minimise dust generation;
- Vehicle loads containing loose materials would be covered;
- Consideration would be afforded to ceasing dust generating works during high wind;
- Complaints regarding dust and exhaust emissions would be immediately addressed with the implementation of additional controls if warranted;
- Exposed ground surfaces would be stabilised and rehabilitated as soon as practicable in accordance with the Blue Book (Landcom 2004);
- Vegetation clearing and disturbance would be minimised where practicable;
- The proposed substation Contractor would ensure that SF6 gas bottles are secure during transportation and while in storage on-site to reduce risk of damage to the bottles and potential gas leaks; and
- Work vehicles/machinery would not be left running or idling when not in use.

Operation

- A hazard analysis would be undertaken by TransGrid during the detailed design phase of the proposed substation to identify incidents that could lead to a release of SF6 and the development of an asphyxiant concentration. An Emergency Response Plan would be developed for the proposed substation which would be implemented in the event of an SF6 leak;
- Transport, storage and use of SF6 gas would be in accordance with TransGrid's procedure for the *Management of SF6 Gas (GM AS S2 017)*; and
- Safe procedures and work practices would also be followed in accordance with TransGrid's procedure for the *Management of SF6 Gas (GM AS S2 017)* during handling of the switchgear to limit the potential for a spill of SF6 gas into the atmosphere.

7.11. Noise and Vibration

This section provides an overview of the potential noise emissions, which may affect the amenity of the surrounding area during both construction and operation of proposed substation. The full noise impact assessment report is contained in **Appendix E**.

7.11.1. Noise Criteria

Construction

The *DECCW Interim Construction Noise Guidelines* (ICNG) (2009) establishes a framework to deal with the impacts of construction noise on residences and other sensitive land uses. The ICNG recommends a qualitative assessment is carried out for all major construction projects that is based on worst case construction scenario.

The quantitative assessment method involves predicting noise levels and comparing them with the levels in the ICNG. Guidance noise levels are given for airborne noise at sensitive land uses, including commercial and industrial premises, ground-borne noise and sleep disturbance. Predicted noise levels in conjunction with the existing background levels are then compared to Section 4 of the ICNG to determine whether the Noise Management Levels (NMLs) would be met and whether noise mitigation measures would be required during the construction phase.

Operational Noise

The *DECCW Industrial Noise Policy* (INP) (2005) provides a framework for deriving project specific noise limits for industrial premises and would apply to operation of the proposed substation.

The INP sets two separate noise criteria to meet environmental noise objective: one accounting for intrusive noise and another to protect the amenity of particular land uses. The INP requires that if noise from the development under assessment complies with the lower of the amenity or intrusiveness criteria levels, then no acoustical impact would be expected. For a particular project, the more stringent of the intrusive or amenity criteria sets the project-specific noise levels.

A noise source is considered to be non-intrusive if the LAeq (i.e. energy average of the varying noise over the sample period), 15 minute level does not exceed the Recommended Background Level (RBL) by more than 5 dB(A) for each of the day, evening and night-time periods, and does not contain tonal, impulsive, or other modifying factors as detailed in Chapter 4 of the INP.

The amenity criterion is based on the zoning and the land use of the receiver location and the extent of the existing industrial noise in the area.

Background noise monitoring has been completed at selected sensitive receivers in the vicinity of the proposed substation (**Figure 7-14** shows the proposed substation site and receiver locations). These measured background levels together with the intrusive and amenity criteria have been used to develop the noise criteria for the proposed substation. The results of background noise monitoring are provided in **Section 7.11.2**.

Table 7-11 provides the operational noise emission criteria for the proposed substation. The logger located at Driftway Drive was considered to be representative of the critical receiver

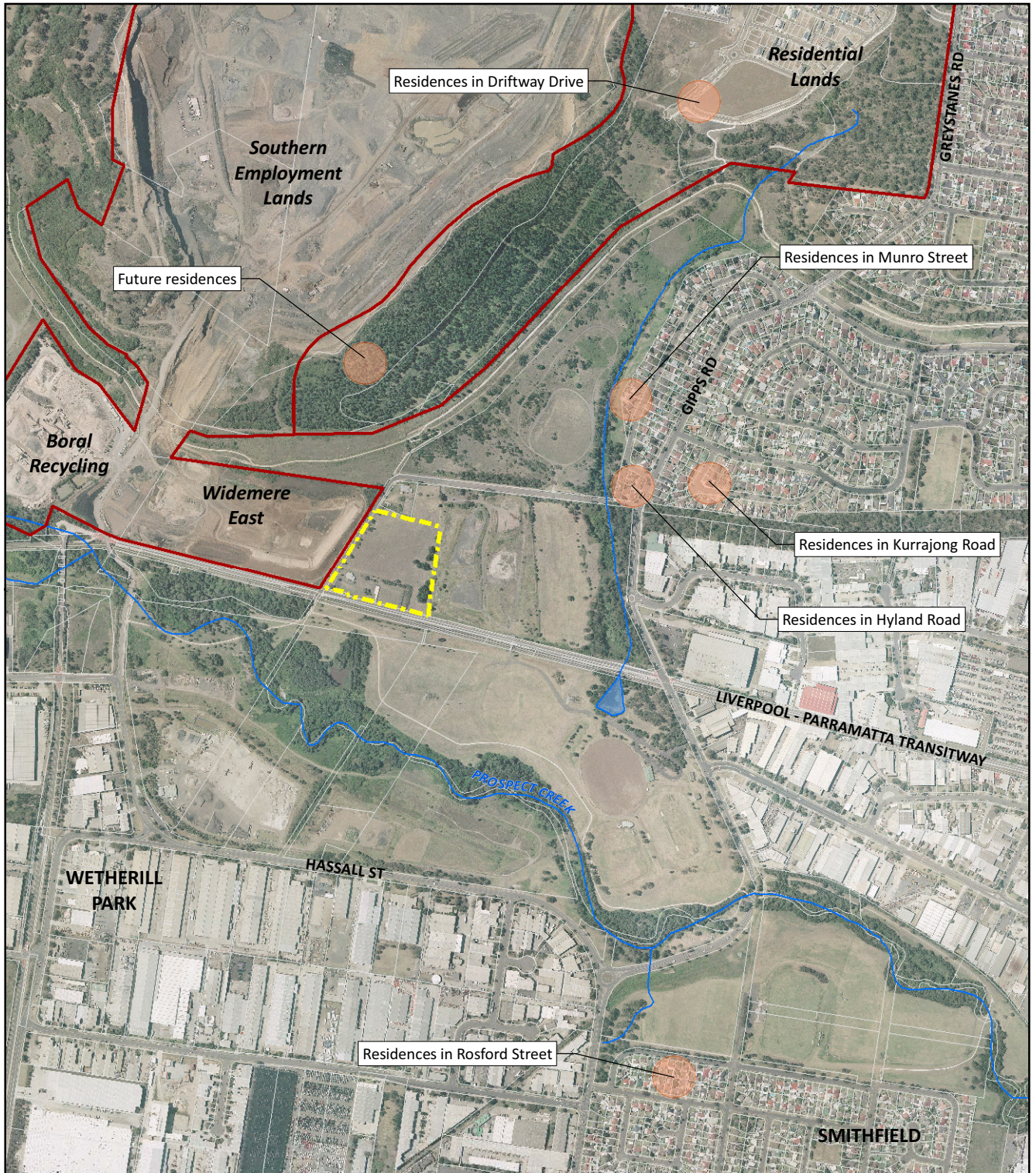
locations at Munro Street, Kurrajong Road and the boundary of the land zoned as residential to the north of the proposed substation site.

■ **Table 7-11 Summary of Environmental Noise Criteria, dBA**





Period	RBL (L _{A90})	Intrusive criterion = RBL+5	Amenity criteria (dB(A))	Environmental criteria
Hyland Road				
Day	46	51	55	51
Evening	38	43	45	43
Night	32	37	40	37
Kurrajong Road, Munro Street, Driftway Drive and residentially-zoned land to the north of the proposed site				
Day	40	45	55	45
Evening	40	45	45	45
Night	35	40	40	40
Rosford Street				
Day	48	53	55	53
Evening	42	47	45	45
Night	38	43	40	40

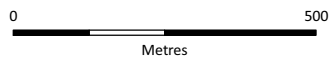
The INP also sets noise penalties of up to 5dB(A) for noise emissions that are tonal or have a significant low frequency content. A tonality screening test performed for equipment to be used in the proposed substation has determined that operation of the proposed substation would not be perceived as tonal according to the definitions of the INP. No tonality penalty would be applied to this development.

Figure 7.14 | Proposed Substation Site and Receiver Locations

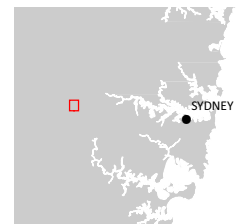


LEGEND

-  Site boundary
-  Receiver locations for background, attended & predicted noise levels
-  Indicative Boral Greystanes Estate Precinct boundary
-  Cadastral boundary



DATA SOURCES
 Topographic : Department of Lands NSW 2009
 Aerial photography : Ausimage 2009



7.11.2. Existing Environment

Overview

The site is bordered to the west by Hyland Road, to the east by the former Holroyd City Council landfill, to the south by the Liverpool to Parramatta Transit-way and Sydney Water Corporation twin water pipelines, to the north by the Hyland Road Youth Centre and to the north and west by the former Boral Prospect Quarry (now known as the Boral Greystanes Estate Precinct). The closest residential receivers are on Hyland Road approximately 400 metres north east of the proposed substation, although future residential land which is part of the Boral Greystanes Estate Precinct would be approximately 200 metres to the north.

The proposed substation would involve bulk earthworks associated with construction of the substation bench, GIS Building and other infrastructure, structures and equipment. During operation the transformers would emit a hum.

Background Noise Monitoring

Background noise levels are measurements taken where possible without influence of construction and/or industrial noise sources. Measurements denote typical day and night time variations in noise levels in the ambient noise environment to provide a basis for setting noise level goals. Unattended background noise monitoring was undertaken at three locations in the vicinity of the proposed substation site including:

- Hyland Road, Greystanes;
- Driftway Drive, Greystanes; and
- Rosford Street, Greystanes.

The background noise levels measured are shown **Table 7-12**.

■ Table 7-12 Background noise levels

Monitoring site	L _{A90} dB		
	Day	Evening	Night
Hyland Road	46	38	32
Driftway Drive	40	40	35
Rosford Street	48	42	38

Supplementary attended noise monitoring measurements was also undertaken at five critical sensitive receivers. The results of the attended measures are provided in **Table 7-13**.

■ **Table 7-13 Attended noise measurements**

Monitoring site	Measurement time	L _{Aeq 15min} dB	L _{A90} dB
Hyland Road	11.23am	61	50
Kurrajong Road	12.34pm	54	43
Munro Street	12.15pm	47	43
Driftway Drive	10.55am	49	43
Rosford Street	11.53am	53	49

It was not possible to access the future receiver locations to the north of the proposed substation site within the Boral Greystanes Estate Precinct for the background monitoring. However, it is considered that the noise measurements at Driftway Drive are representative of the background noise in this location.

7.11.3. Potential Impacts

Potential noise and vibration impacts associated with construction and operation of the proposed substation are described below.

Construction

During the construction phase, noise would be generated from construction of the substation bench, GIS Building and other infrastructure, structures and equipment by machinery likely to include bulldozers, backhoes, rollers, scrapers, excavators, concrete trucks, mobile cranes, truck mounted boring rigs, jackhammers and haul trucks. While the details of the construction methodology has not been finalised, for the purposes of this assessment some assumptions have been made about the types of construction activities that would take place and the types of equipment that would be used. A list of the likely plant and equipment that would be used during the construction phase as well as their corresponding noise level is shown in **Table 7-14**.

■ **Table 7-14 Description of expected construction equipment and associated L_{Aeq} Sound Power Level**

Equipment	Number of Plant Items	Sound Power Level dB(A)	L _{Aeq} sound pressure level at 7m
Excavator **1	2	95	70
Compactor	2	108	83
Mobile Crane	1	110	85
Dump Truck	2	108	83
Hand Tools	3	110	85

Note 1: Assumes DECCW residential grade muffler in use

Based on the use of equipment noted in **Table 7-14**, the likely impact of construction noise at the closest receiver is shown in **Table 7-15**.

■ **Table 7-15 Predicted Construction Noise Level at Closest Receiver**

Receiver	Distance from Site Boundary (m)	Daytime Construction Noise Management Level dB(A)	Predicted LAeq Noise Levels, dB(A)	Compliance with NMLs (Section 4 of the ICNG)
Hyland Road	400	56	52	Yes
Kurrajong Road	475	50	50	Yes
Munro Street	500	50	49	Yes
Driftway Drive	1050	50	42	Yes
Rosford Street	1250	58	40	Yes

The construction noise impact at all receivers is shown to comply with the Noise Management Levels derived from procedures set out in the Section 4 of the ICNG.

Considering the distance between the nearest residential receiver it has been determined that there would be no vibration related impacts associated with construction of the proposed substation.

Operation

During operation of the proposed substation the main sources of noise would include noise emissions from transformers and reactors.

Noise impacts from traffic during the operation of the proposed substation would be negligible with site traffic limited to staff and contractors attending site for maintenance activities.

Table 7-16 provides the results of the noise impact assessment completed in accordance with the INP for operation of the proposed substation. This assessment was based on a standard set of assumptions on the proposed height of a wall erected mid way between the two transformers, wind speed, site slope, point sources on the transformers and reactors and height of the GIS building. Noise generated by the proposed substation would meet day time and evening INP noise criteria.

■ **Table 7-16 Modelling results**

Receiver Location	Night-time criterion, dB(A)	Option 1 - No treatment	Option 2 - 5 metre barriers around north, and east of reactors	Option 3 - 5 metre barriers around transformers to reduce Lw of reactors by 4 dBA
<i>3.0 m/s source to receiver wind conditions</i>				
Driftway Drive	40	28.2	25.1	23.7
Hyland Road	37	38.3	34.4	32.4
Kurrajong Road	40	36.8	33.0	31.0
Munro Street	40	36.5	33.8	31.5
Residentially-zoned land	40	45.4	42.6	40.5
Rosford Street	40	28.4	28.4	25.0

Night-time noise criteria would not be met at the residential receivers on Hyland Road and future residential receivers to the north of the site within the Boral Greystanes Estate Precinct without additional noise mitigation.

Options 2 and 3 would involve the incorporation of noise barriers around the reactors. Option 3 presents the least impact on the future Boral Greystanes Estate Precinct to the north with the night-time criterion being exceeded by only 0.5 dB(A) and meeting criteria at all other locations. This small exceedence is considered acceptable given the accuracy of modelling and monitoring noise.

There would be no vibration related impacts associated with operation of the proposed substation given the separation between any sources of vibration from the site and the nearest residences.

7.11.4. Mitigation Measures

Recommendations for the protection and management of noise and vibration in relation to both the construction and operational phases of the proposed substation are outlined below.

Construction

The following construction mitigation measures would be incorporated into the CEMP:

- Construction activities would take place during recommended standard working hours (7.00am to 6.00pm Monday to Friday, 8.00am to 1.00pm Saturday and no work on Sunday or public holidays). Any work outside of these hours would be undertaken in accordance with the DECCW Interim Construction Noise Guidelines (DECCW 2009);
- If after hours or night time work is required (i.e. for transformer deliveries), the Holroyd City Council and other potentially affected residents and community members would be notified by letter at least 24 hours prior. The letter would include details of the location, duration and hours of construction, and contact names and numbers for enquiries and complaints;

- Regular community notifications would be distributed to noise-affected properties to advise on upcoming works;
- A complaints register would be maintained to log all noise related complaints and the response to the complaint;
- Plant and equipment would be turned off when not in use; and
- All plant and equipment would be regularly maintained.

Operation

- Consideration would be given to the incorporation of noise barriers to the north and east or around the reactors during the detailed design process; and
- Equipment would be regularly and effectively maintained.

7.12. Electromagnetic Fields

7.12.1. Existing Environment

Electromagnetic Fields (EMF) are associated with a wide range of sources and occur both naturally as well as man-made. Naturally occurring EMFs are those associated with lightning or the Earth's magnetic field. Man-made EMF's occur wherever electricity is present, meaning we are constantly exposed to EMFs in our home and work environments.

EMFs have been the subject of extensive scientific studies both in Australia and overseas over the past 20 years with particular focus on the effect of EMF on human health. The results of all EMF studies to date have indicated either no association or a weak association with adverse health effects (Australian Radiation Protection and Nuclear Safety Agency 2009).

There are currently no Australian standards regulating exposure to EMF's. The National Health and Medical Research Council (NHMRC) has issued interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields (NHMRC 1989). These guidelines are aimed at preventing immediate health effects resulting from exposure to these fields, and are currently subject to a review by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA).

The NHMRC recommended exposure limit for members of the public (24 hour exposure) is 1,000 milliGauss (mG) for magnetic fields and 5 kilovolts per metre (kV/m) for electric fields. For exposure up to a few hours a day, the guidelines recommend exposure be limited to 10,000 mG for magnetic fields, and 10 kV/m for electric fields (ARPANSA 2009).

Table 7-17 below provides typical magnetic field measurements and ranges associated with various EMF sources. Electric fields around most equipment/appliances are close to zero due to the shielding that is provided by the equipment itself. According to ARPANSA exposure levels to magnetic fields around the home are in the range of 0.1 to 2.5 milliGaus (mG).

■ **Table 7-17 EMF Sources**

Source	Typical Measurement (mG)	Range of measurement (mG)
Television	1	0.2 to 2
Refrigerator	2	2 to 5
Kettle	3	2 to 10
Personal computer	5	2 to 20
Electric Blanket	20	5 to 30
Hair dryer	25	10 to 70
Distribution power line (under the line)	10	2 to 20
Transmission power line (under the line)	20	10 to 200
Edge of easement	10	2 to 50

Note: Owing to variations in the design of electrical appliances and the loadings on powerlines, the EMF levels may vary. The table above is based on a consistent set of measurements undertaken by power authorities in Australia using similar techniques and protocols to overseas measurements.
Source: *Electricity Network Association 2006*

To the south of the proposed substation site are existing 132kV transmission lines, which as noted in **Section 2.1** would be upgraded to 330kV under the Western Sydney Supply Project. Like other types of electrical equipment, transmission lines produce both electric and magnetic fields. The strength of the electric field varies generally with the operating voltage of the line while the magnetic field strength is related to the current (amps) flowing in the line. The existing transmission lines have easements (legal 'right-of-ways') established immediately below and on either side of the lines. Within these easements development of other structures is restricted, to ensure safe operation of the lines and also to protect the public from electrical hazards. While developments and some activities are not permitted within easements, in general, easements remain open and accessible, as is the case for the transmission lines to the south of the proposed substation site.

7.12.2. Potential Impacts

As noted in **Section 4.2.3**, the transmission line connections would be subject to a separate environmental assessment which would include a discussion on EMF.

The proposed substation would introduce new high voltage equipment into the area and as such would represent a new source of EMF. Potential sources of EMF include:

- Busbars and other overhead or underground connections within the substation:
- Transformers;
- Switchgear;
- Underground cables; and
- Reactive Plant.

The proposed substation would result in the Hyland Road Youth Club and the newly relocated Hyland Road Rifle Range and Pigeon Club share facilities being located adjacent the northern

boundary. However, TransGrid expects that EMF levels external to the substation site would be insignificant and there would be no potentially harmful outcomes as a result of the operation of the proposed substation. In addition, operation of the proposed substation is not expected to result in a significant change to EMF levels at residential dwellings in the vicinity of the proposed substation site.

With regard to occupational exposures, TransGrid design standards would ensure that workers within the substation would encounter fields at similar acceptable levels to those obtaining at the other 330kV and 500kV substations on the NSW grid.

7.12.3. Mitigation Measures

Recommendations for the management of EMF during the operational phases of the proposed substation are outlined below.

Construction

No mitigation measures for EMF are required for the construction phase.

Operation

- The substation would be designed in line with guidelines and principles for equivalent facilities to minimise the risk of EMF for staff and members of the public. Should areas of the substation not comply with the relevant guidelines, signs would be erected to ensure TransGrid staff are aware of the risks;
- Place appropriate security around EMF emitting structures;
- TransGrid would adopt a careful approach to EMF management and would:
 - Closely monitor ongoing research and reviews by scientific panels, and overseas policy developments;
 - Continuously review EMF policies and practices;
 - Measure field strengths of EMF, where appropriate; and
 - Promote employee awareness and provide information on request to interested people.
- TransGrid procedures associated with both power frequency electric and magnetic fields and radio frequency electromagnetic fields would be complied with.

7.13. Waste Management and Minimisation

7.13.1. Existing Environment

As discussed in **Section 7.7.1**, Phase 1 and 2 Contamination Assessments (SKM 2008a and SKM 2008b) were undertaken to assess the existing conditions and suitability of the proposed substation site with regard to contaminated soil from historic and current site activities. The intrusive investigations recorded three areas of concern in the proposed substation site (refer **Figure 7-12**). Two of these areas of concern were related to asbestos material in fill, one located on the eastern boundary and one man-made embankment surrounding the rifle range. The third was associated with elevated lead concentrations in soils directly adjacent to the firing range. A

Remediation Action Plan (RAP) has been prepared to identify options to manage the contamination prior to and during construction of the proposed substation.

7.13.2. Potential Impacts

Potential waste management aspects associated with construction and operation of the proposed substation are described below.

Construction

Activities that would generate waste during the construction of the proposed substation include demolition (Brick and Concrete) excavation (spoil and rock) and vegetation removal (green waste). Other waste materials that may be generated during the construction phase include:

- Excess construction materials (such as fill, concrete, and packaging materials);
- Oil, fuel and chemical spills;
- Domestic waste (such as glass, aluminium cans, plastic bottles, paper, cigarette butts and food waste); and
- Human waste from the construction workforce.

The management of contaminated material would be determined by the proposed substation Contractor during the detailed design phase. Any contaminated material would be disposed of in accordance with the RAP as well as DECCW *Waste Classification Guidelines* (DECCW 2008).

It is not anticipated that the waste generated during the construction phase of the proposed substation would have significant impacts on local waste disposal resources or the natural environment.

Operation

Waste sources during the operational phase of the proposed substation would include general waste generated by maintenance personnel.

7.13.3. Mitigation Measures

Recommendations for management of waste during construction and operational of the proposed substation are outlined below.

Construction

- All wastes would be stored securely whilst onsite to prevent pollutants escaping;
- Arrangements would be made for waste receptacles to be emptied when 80 per cent full;
- The proposed substation site would be kept free of litter at all times;
- The proposed substation site would be left clean and free of waste materials and debris at the completion of the construction phase;
- A Waste Management Plan (WMP) would be developed for the construction phase of the proposed substation which would be incorporated into the CEMP. The WMP would be prepared in accordance with the *Waste Avoidance and Resource Recovery Act 2001*;

Protection of the Environment Operations Act 1997, Waste Classification Guidelines (DECCW 2009b) and TransGrid's procedure for Waste Management (GD EN G3 023);

- The WMP would include a requirement to complete a Waste Removal Register to document types, volumes and classifications of wastes generated, the fate of the materials (i.e. if the materials were reused, recycled or disposed of) and the locations of the re-use and disposal sites; Total tonnages of waste recycled and disposed of would be reported to TransGrid at the completion of the construction phase in accordance with the Waste Reduction and Purchasing Policy (WRAPP) (DECCW 1997) reporting requirements; and
- The WMP would address waste impacts generated by construction works including demolition material, excess construction materials, excavated soil, hazardous materials, green waste, human waste and domestic waste. Where practicable, the WMP would incorporate mitigation measures for the following waste streams to minimise the waste generated:
 - Demolition materials;
 - Off-site recycling and/or reuse of demolition materials including bricks, concrete, timber, steel, iron, aluminium and copper; and
 - Segregation of demolition materials onsite (e.g. timber and steel) to maximise the reuse and recycling potential.
 - Excess construction materials
 - Ensure correct quantities are ordered and delivered to the proposed substation site;
 - The use of recycled materials would be investigated, including concrete and other construction materials;
 - Wash-down of concrete trucks would not be conducted on site unless suitable facilities are provided;
 - Wastes would be securely stored in appropriate receptacles or contained areas; and
 - Materials unsuitable for re-use would be transported off-site and disposed of at appropriately licensed management waste management or recycling facilities. Wastes would be tested and classified before disposal, in accordance with requirements of the licensed waste disposal facility.
 - Excavated soil
 - Any contaminated material would be managed in accordance with the RAP as well as DECCW's Waste Classification Guidelines (DECCW 2009);
 - The removal, handling or disposal of asbestos would be undertaken by an appropriately licensed contractor as per the Code of Practice for the Safe Removal of Asbestos and Code of Practice for the Management and Control of Asbestos in Workplaces;
 - Only clean excavated fill material would be used as construction fill; and
 - Where practicable, topsoil would be stockpiled onsite for future reuse in landscaping activities.

- Green waste
 - All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility; and
 - Where practicable, any vegetation removed from the proposed substation site would be mulched for later reuse in landscaping activities.
- Human waste
 - Portable toilet facilities would be provided during the construction phase. Facilities would be regularly maintained and wastes would be disposed of by a licensed waste contractor in accordance with *Waste Classification Guidelines* (DECCW 2009b).
- Domestic waste
 - Recycling facilities would be provided to encourage the separation and recycling of all paper, aluminium, glass, and plastic products used during construction phase; and
 - All domestic waste would be collected regularly and disposed of at licensed facilities as appropriate.

Operation

- An Emergency Response Plan (ERP) would include measures to respond to a SF6 leak; and
- General garbage generated by maintenance personnel would be managed in accordance with TransGrid's procedure for *Waste Management (GD EN G3 023)*.

7.14. Cumulative impacts

7.14.1. Existing Environment

Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* requires that an environmental assessment of an activity under Part 5 of the EP&A Act takes into account the potential for cumulative environmental impacts with other existing or likely future activities. The anticipated cumulative environmental effects of the proposed substation relate to the combined effect of individual impacts of the proposed substation as well as to the cumulative effect of this project with other nearby projects or planned projects or activities in the locality. Accordingly, proposed developments and existing activities in the locality of the proposed substation site were considered.

Existing activities near the proposed substation site include:

- The former Holroyd City Council landfill to the east;
- Liverpool to Parramatta Transitway and Sydney Water Corporation twin water pipelines to the south;
- Hyland Road Youth Centre to the north;
- Boral Greystanes Estate Precinct (Former Boral Prospect Quarry) to the west and north;
- Public cycleway and pedestrian path to the west; and

- The Hyland Road Rifle Range and Pigeon Club share facilities located on the proposed substation site itself.

As discussed in **Section 7.2**, areas of future urban development in close proximity to the proposed substation site would include the Boral Greystanes Estate Precinct. The Boral Greystanes Estate Precinct would include the development of 300 hectares of land which would be divided into the Southern Employment Lands (SEL), the Northern Employment Lands (NEL) and the Residential Lands (refer to **Figure 7.1**). A concept plan for the SEL was approved by the Minister for Planning on 20 July 2007. Construction dates are currently unknown. The proposed substation is part of the wider Western Sydney Supply Project which would provide for future development in the locality, such as the Boral Greystanes Estate Precinct. There are no other known proposed developments in the locality. The Western Sydney Supply Project would include additional works in the area, including upgrading the existing transmission line connections between the proposed Holroyd substation and Sydney West substations and the addition of an underground cable between the proposed Holroyd and Rookwood Road substations.

7.14.2. Potential Impacts

Construction

Construction of the proposed substation could result in cumulative impacts on native vegetation as 0.16 hectares of Swamp Oak would require removal as well as some planted native tree species. However, the potential impacts of the proposed substation on flora and fauna are not considered to be significant. As such, the proposed substation is not expected to make a significant contribution to cumulative impacts on native vegetation.

The construction of the proposed substation could also result in cumulative impacts on local land use and amenity. Cumulative impacts would be related to construction associated with the Boral Greystanes Estate Precinct and relocation of the Hyland Road Rifle Range and Pigeon Club share facilities occurring in conjunction with construction of the proposed substation leading to increased noise, traffic and air quality related impacts. However, given the mitigation measures which would be implemented during the construction phase cumulative impacts are not expected to be significant.

The construction of the proposed substation could also result in positive cumulative impacts as local contractors would be employed during construction works and equipment and materials from the surrounding area would be used, where possible. In addition, the remediation of contaminated soil located on the proposed substation site would be undertaken by the Contractor (as discussed in **Section 7.7.3**). The construction of the proposed substation would also result in the renewal of the Hyland Road Rifle Range and Pigeon Club share facilities.

7.15. Principles of ecologically sustainable development

As shown in **Table 7-18**, the principles of ecologically sustainable development (ESD) have formed an integral part of the concept design and environmental assessment of the proposed substation. Generally, ESD is development that aims to meet the needs of the current generation,

whilst maintaining and conserving natural resources and ecosystems for the benefit of future generations.

The principles of ESD, as defined in Clause 6 of Schedule 2 of the *Environmental Planning and Assessment Regulations 2000*, are as follows:

- Precautionary principle;
- Intergenerational equity;
- Conservation of biological diversity (biodiversity) and ecological integrity; and
- Improved valuation and pricing of environmental resources.

The guiding principles of ecologically sustainable development are explained below. **Table 7-18** summarises how the proposed substation would be consistent with the principles of ESD.

Precautionary principle

The precautionary principle means that if there are any 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.

Inter-generational equity

Inter-generational equity means 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.

Conservation of biological diversity and ecological integrity

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

Improved valuation and pricing of environmental resources

Improved valuation, pricing and incentive mechanisms means that environmental factors should be included in the valuation of assets and services, such as:

- (i) Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement.
- (ii) The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.
- (iii) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

■ **Table 7-18 Application of the principles of ESD to the project**

ESD principle	Feasibility Studies	Project
Precautionary principle	Early strategic assessment - the best available technical information was used and best practice environmental standards, goals and measures to minimise environmental risks was adopted.	A preliminary environmental risk assessment was prepared at the project feasibility stage for the Feasibility Report (SKM 2008c). Best practice measures are included in the mitigation measures proposed throughout this REF and incorporated into Section 8 .
Inter-generational equity	The decision to establish the proposed substation has integrated long and short-term economic, environmental, land use and social (including social equity) considerations, to provide reliable electricity supply for future generations and to ensure that any foreseeable impacts are not left to be addressed by further generations.	Issues that have potential long-term implications, such as consumption of non-renewable resources, waste disposal, greenhouse emissions, removal of vegetation and impacts on visual amenity and water quality, would be avoided and minimised as far as practicable through feasibility studies as well as through the final concept design and application of management measures as described in Section 8 . The project ensures an uninterrupted supply of power to the greater Sydney region for future generations.
Conservation of biological diversity	The need to assess potential impacts to biological diversity from the establishment of the proposed substation was recognised at project inception.	Feasibility studies by SKM in 2008 have sought to avoid and minimise environmental impacts as much as possible. The flora and fauna studies undertaken by SKM in 2009 indicated that there would be no significant effect or change on biodiversity.
Improved valuation, pricing and incentive mechanisms	Environmental and social costs/ benefits were considered alongside economic and financial costs/benefits in the decision to establish the proposed substation and during the site selection process.	Environmental and social issues were considered during the strategic planning, establishment of the need for the project, and in the consideration of options. The value placed on environmental resources is evident in the extent of the planning, environmental investigations and design of management measures.

8. Environmental Management

8.1. Overview

TransGrid has developed an Environmental Management System (EMS) which is certified under the international standard ISO 14001:2004. Compliance to the EMS certification requires TransGrid to document their environmental aspects and accordingly manage their environmental impacts. The Construction Environmental Management Plan (CEMP) would detail the strategies and management methods used to deliver the environmental management requirements for the construction phase of the substation. The CEMP would be consistent with the principles of TransGrid's existing EMS.

The CEMP and a summary of the proposed safeguards suggested by this REF are further discussed in the following sections.

8.2. Construction Environmental Management

A CEMP would be prepared for the construction of the proposed substation by the proposed substation Contractor in accordance with TransGrid's EMS. The CEMP would address all potential environmental constraints and detail construction impact mitigation measures identified in this REF. The CEMP would be a 'working' document and would be updated if deficiencies are identified during construction or if there is any change to the scope of work.

The CEMP would be endorsed by TransGrid prior to commencement of any works and would be monitored and audited by a TransGrid representative during the construction phase. Any corrective action requests arising from environmental audits would be followed up (through re-inspection) within an agreed timeframe between the TransGrid representative and substation Contractor. During construction, the substation Contractor would ensure that the proposed substation site would be well managed and equipment and vehicles are kept tidy.

In addition, an Environmental Inspector would be engaged by TransGrid to examine compliance with legislation and statutory approvals and with management measures in the CEMP and EMS. The Environmental Inspector would provide a final report which would include a review of compliance and management of any outstanding issues.

8.3. Operational Environmental Management

As noted in **Section 4.6**, operation of the proposed substation would be in accordance with TransGrid's Environmental Management System (EMS), which is third party certified to *AS/NZS ISO 14001 EMS*.

Any site-specific requirements (i.e. a Site Emergency Response Plan) would be incorporated in maintenance instructions. Compliance with the EMS and maintenance instructions would be confirmed by periodic audits and through regular maintenance and environmental inspections required by the Maintenance Management System and the EMS. Environmental data relating to the proposed substation would be included in TransGrid's Geographical Information System (GIS) (e.g. TAMIS).

8.4. Summary of Proposed Environmental Mitigation Measures

Table 8-1 provides a summary of the safeguards proposed by this REF to be implemented during the construction and operational phases.

■ **Table 8-1 Summary of Proposed Construction and Operational Environmental Safeguards**

Impact	Ref #	Proposed Mitigation Measures	Responsibility
General Environmental Management			
Construction	GE1	<ul style="list-style-type: none"> Notify TansGrid of any pollution incidents that cause or threaten material harm to the environment that occur as a result of construction of the proposed substation. 	Substation Contractor
	GE2	<ul style="list-style-type: none"> Notify DECCW of any pollution incidents that cause or threaten material harm to the environment that occur as a result of construction of the proposed substation. 	TransGrid
Operation	GE3	<ul style="list-style-type: none"> Notify DECCW of any pollution incidents that cause or threaten material harm to the environment that occur as a result of operation of the proposed substation. 	TransGrid
Land use and Social impacts			
Construction	LS1	<ul style="list-style-type: none"> Ongoing community consultation to address any community and stakeholder concerns and/or issues. 	Substation Contractor
Operation	LS2	<ul style="list-style-type: none"> Ongoing community consultation to address any community and stakeholder concerns and/or issues. 	TransGrid
Flora and Fauna			
Construction	FF1	<ul style="list-style-type: none"> Weed management practices (e.g. hand pulling or digging of seedlings and immature plants ensuring all main roots are removed, excavation with machinery and/or the application of herbicide) would be incorporated into proposed construction activities. All noxious weed propagules present within the proposed substation site would be removed and disposed of to ensure these are not spread into adjacent habitats. 	Substation Contractor
	FF2	<ul style="list-style-type: none"> Pruning and direct avoidance would be used to protect tree (i.e. Swamp Oak and planted species) cover where practicable. 	Substation Contractor
	FF3	<ul style="list-style-type: none"> Landscaping would utilise local indigenous native species characteristic of River flat Eucalypt Forest (Appendix B of the Flora and Fauna Assessment Report (refer Appendix B) identifies species that could be used for landscaping). 	Substation Contractor
	FF4	<ul style="list-style-type: none"> Construction personnel would ensure trees being removed are inspected for fauna prior to removal. If fauna are present a wildlife carer would be contacted to determine the appropriate course of action. 	Substation Contractor
Operation	FF5	<ul style="list-style-type: none"> Weed management practices (i.e. for the Castor Oil Plant) would be in accordance with TransGrid's procedure for <i>Noxious Weed Control (GM EN G2 010)</i>. 	TransGrid
Non-Indigenous Heritage			
Construction	NH1	<ul style="list-style-type: none"> Should any previously unrecorded non-Indigenous archaeological artefacts (i.e. relics as defined by the <i>Heritage Act 1977</i>) be encountered during the works, all activity in the immediate vicinity would cease and TransGrid would be notified. 	Substation Contractor
	NH2	<ul style="list-style-type: none"> Should any previously unrecorded non-Indigenous 	TransGrid

Impact	Ref #	Proposed Mitigation Measures	Responsibility
		archaeological artefacts be uncovered, further construction activities would not be undertaken until the Department of Planning (DoP), Heritage Branch has been notified and the site has been assessed by the archaeologist to identify an appropriate course of action.	
Operation	NH3	<ul style="list-style-type: none"> Consultation would be undertaken with Holroyd City Council to discuss measures to reduce and mitigate potential impacts to the heritage elements of the Hyland Road Farm Group and the twin water pipelines. The mitigation measures in Section 7.6.4 would likely reduce the impact on heritage elements of the Hyland Road Farm Group and the twin water pipelines. 	TransGrid
Indigenous Heritage			
Construction	IH1	<ul style="list-style-type: none"> If indigenous archaeological material is encountered during the construction phase, works would cease immediately and TransGrid would be notified. 	Substation Contractor
	IH2	<ul style="list-style-type: none"> An archaeologist would be engaged to assess the archaeological material. Advice would be sought from the DECCW regarding appropriate management of the find(s). This may include the requirement to obtain a Section 90 Consent to Destroy and/or a Section 87 Permit under the <i>NPW Act 1974</i>. 	TransGrid
Operation	-	<ul style="list-style-type: none"> Nil 	-
Visual Amenity			
Construction	-	<ul style="list-style-type: none"> Nil 	-
Operation	VA1	<p>Landscape Strategy</p> <ul style="list-style-type: none"> Screening vegetation would be used around the perimeter of the proposed substation site to screen the development from sensitive viewpoints. Species selected would be local indigenous natives and may include canopy species to reduce the scale of the buildings. 	Substation Contractor
	VA2	<ul style="list-style-type: none"> Low growing native grasses would provide a dense cover at ground level which would provide a low maintenance landscape and a visually pleasing solution which is in keeping with the natural environment. 	Substation Contractor
	VA3	<ul style="list-style-type: none"> The landscape strategy would consider the required safety clearances of planted vegetation to easements and/or security fences, structural features (i.e. tree roots can destabilise structures if planted too close) and the potential fire risk (i.e. a dense cover of low native grasses could increase the risk of a ground fire). 	Substation Contractor
	VA4	<p>Visual Treatments (i.e. architectural and design incorporations)</p> <ul style="list-style-type: none"> The 330kV GIS building would be designed to look like a sporting complex style building or a high quality urban industrial building. 	Substation Contractor
	VA5	<ul style="list-style-type: none"> A selection of the following visual treatments (i.e. architectural and design incorporations) would be used to reduce the visual impacts of the proposed substation: <ul style="list-style-type: none"> The perceived height of the substation building would be reduced by breaking it into two. This would be achieved by wrapping the metal roof down over the façade and presenting the building as a large span building. By stopping the metal short of the ground, a human scale would be introduced 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
		<p>around the base of the substation;</p> <ul style="list-style-type: none"> - Introduction of awnings: using shadow would assist in reducing the appearance of building bulk, allowing the upper portion of the building to read as a roof wrapping down to the awning; - Articulation: the introduction of a series of slots would physically break the length of the main north and south façades; - Palette of materials: restrained palette of materials, metal cladding, polycarbonate and masonry would be used where practicable; and - Connectivity: the GIS building's role in power distribution would be acknowledged by articulating slots in the substation façade at the points where the connections are made with the incoming and outgoing insulator pipes. 	
	VA6	<ul style="list-style-type: none"> • Consideration would be given to the use of the following design features and materials: <ul style="list-style-type: none"> - A GIS building constructed predominantly from metal cladding or equivalent with wide pan standing seams to break down the scale of the building; and - A glazed brick/ceramic tile feature to bring colour into the base and ends of the GIS building. 	Substation Contractor
	VA7	<ul style="list-style-type: none"> • A range of other visual treatments would be considered for the other key elements of the proposed substation. These treatments are described below: <ul style="list-style-type: none"> - Transformer compound walls would be painted in tones to reduce reflectivity; - The appearance of the modular transportable control building would be softened with tones to reduce reflectivity on the roof and walls and will visually fit in with the design of the other buildings; - Selected components of the 132kV outdoor switchyard would be treated with a low reflectivity finish; - The use of decorative person-proof walls to break up the visual fence lines. - A low reflectivity finish would be used for the surface of the 132kV outdoor switchyard; and - The gantry structure, all 132kV equipment support structures and palisade security fence would be painted in a colour which will blend in with the landscape. 	Substation Contractor
Topography, Geology and Soils			
Construction	TGS1	<p>Erosion and Sediment Control</p> <ul style="list-style-type: none"> • The extent and duration of bulk earthworks would be minimised as far as practicable. 	Substation Contractor
	TGS2	<ul style="list-style-type: none"> • Land disturbed by excavation or other construction activities would be stabilised as soon as practicable. 	Substation Contractor
	TGS3	<ul style="list-style-type: none"> • A Soil and Water Management Plan (SWMP) would be prepared as part of the CEMP by an appropriately qualified person in accordance with the Landcom (2004), Managing Urban Stormwater: Soils and Construction, Volume 1 Soil and Construction (The Blue Book) and would be approved by TransGrid prior to the commencement of construction works. 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
	TGS4	<ul style="list-style-type: none"> Erosion and sediment control measures would be established before work begins and maintained in effective working order throughout the duration of the construction phase, and until the site has been stabilised. 	Substation Contractor
	TGS5	<ul style="list-style-type: none"> Bulk earth works would be avoided, where practicable, during periods of heavy rainfall events. 	Substation Contractor
	TGS6	<ul style="list-style-type: none"> Footpath, kerb and road surfaces adjacent to the proposed substation site would have appropriate erosion and sedimentation controls in place. 	Substation Contractor
	TGS7	<ul style="list-style-type: none"> Erosion and sediment control devices would be inspected after a heavy rainfall event to ensure on-going effectiveness. Any damage to erosion and sediment controls would be rectified immediately. 	Substation Contractor
	TGS8	<ul style="list-style-type: none"> Access and egress points would be stabilised to minimise the potential for excavated material to be tracked offsite. 	Substation Contractor
	TGS9	<ul style="list-style-type: none"> Mud and soil would be removed from tyres and under surfaces of construction vehicles and equipment before entry to public roads. 	Substation Contractor
	TGS10	<ul style="list-style-type: none"> Any sediment/soil transferred from the proposed substation site to adjacent roadways/footpaths would be swept up at the end of each work day and disposed of. 	Substation Contractor
	TGS11	<ul style="list-style-type: none"> All areas with disturbed soils would be stabilised and protected in accordance with Section 7 of the Blue Book (2004). 	Substation Contractor
	TGS12	<ul style="list-style-type: none"> Stripped topsoils and chipped vegetation would be stockpiled where practicable for later use in landscaping works. 	Substation Contractor
	TGS13	<p>Contamination</p> <ul style="list-style-type: none"> Identified contamination would be remediated by: <ul style="list-style-type: none"> Excavation of the fill material containing asbestos fibres and the lead impacted soils and transporting the material to a licensed landfill. It is recommended that remediation of RA1 (refer Figure 7-12) is completed in conjunction with remediation works by Holroyd City Council on the adjacent former landfill site as remediation works on the proposed substation site alone would destabilise the embankment and require additional stabilisation works ; and Installation of a physical barrier over contaminated material to remove exposure pathways between receptors of concern and the contaminant sources. It is likely the capping layer would be constructed using compacted clay or a geo-textile with compacted imported Virgin Excavated Natural Material (VENM). 	Substation Contactor
	TGS14	<ul style="list-style-type: none"> If the detailed design shows the area where RA1 is found is not required for construction, the area may be fenced off and left undisturbed. 	Substation Contactor
	TGS15	<ul style="list-style-type: none"> To satisfy State Environmental Planning Policy No, 55 – Remediation of Land, environmental controls listed in the RAP would be implemented. 	Substation Contactor
	TGS16	<ul style="list-style-type: none"> Should any indication of previously unidentified contaminated soils be discovered during the construction phase, all work in that area would cease and the proposed substation Contractor would notify TransGrid's Project Manager immediately to determine the appropriate course of action. 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
	TGS17	<ul style="list-style-type: none"> If deemed necessary, notify DECCW (EPA Branch) in the event previously unidentified contaminated material is uncovered. 	TransGrid
Operation	TGS18	<ul style="list-style-type: none"> With relation to contaminated soil impacting TransGrid staff, a visual assessment of the proposed substation site would be undertaken by a suitably qualified Environmental Professional as directed by TransGrid to check the site does not pose a significant risk to human health or the environment. 	TransGrid
Water Quality and Hydrology			
Construction	WH1	Refer Topography, Geology and Soils. In addition, as groundwater could be expected at approximately 28 metres AHD further measures to mitigate potential contamination seepages into groundwater will be developed.	Substation Contactor
Operation	WH2	Stormwater Runoff <ul style="list-style-type: none"> The stormwater runoff generated by the proposed substation and associated hardstands would be treated prior to discharge into the adjacent drainage system and surrounding waterways through the proposed water quality (bio-filtration) basin shown in Figure 7.13. 	TransGrid
	WH3	<ul style="list-style-type: none"> Water Sensitive Urban Design (WSUD) principles would be applied where practicable to the design of the proposed substation to provide the required treatment. 	Substation Contactor
	WH4	Flooding <ul style="list-style-type: none"> A stormwater detention basin (minimum volume 873 metres cubed) would be installed at the south-eastern end of the proposed substation site to ensure peak flows are maintained at flow rates equal or smaller to pre-development flow rates. The design of the detention basin would meet Holroyd City Council Revised On-Site-Detention Policy (December 2003) and would mitigate potential contamination seepages into groundwater. 	Substation Contactor
	WH5	Oil and Chemical Spills <ul style="list-style-type: none"> Plant and equipment located at the transformers area would be a bunded to hold up to 130 percent of the total volume of oils stored. 	Substation Contactor
	WH6	<ul style="list-style-type: none"> The bunding would act as the primary containment system and would drain to a spill oil tank and then discharge to the secondary containment dam that would incorporate an oil and water separator. Access to the spill oil tank and provision for staff and equipment to pump out the contaminated water mixture would be provided. The secondary containment dam would be designed to ensure the outflow does not contain any oil droplets larger than 0.15 millimetres in diameter at a time of maximum stormwater inflow including fire water. 	Substation Contactor
	WH7	<ul style="list-style-type: none"> The outflow from the secondary containment dam would be discharged to the detention/water quality pond before it departs the proposed substation site. 	Substation Contactor
	WH8	<ul style="list-style-type: none"> The areas within 10 metres of the bunding would be drained to the secondary containment dam. Any other oil-filled equipment on the proposed substation site would be drained through the secondary containment dam. 	Substation Contactor
	WH9	<ul style="list-style-type: none"> All dangerous goods would be handled and stored in a 	TransGrid

Impact	Ref #	Proposed Mitigation Measures	Responsibility
		designated area away from stormwater pits and would be in accordance with the Storage and Handling of Flammable and Combustible Liquids under the <i>Occupational Health and Safety Act 2000</i> , as well as the chemicals Material Safety Data Sheets (MSDS).	
	WH10	<ul style="list-style-type: none"> Spill kits would be provided for the cleanup of accidental spills or leaks of chemicals and fuels. All staff would be adequately trained in spill response procedures and all spills would be cleaned up immediately and resultant waste material would be disposed of at an appropriate licensed facility. 	TransGrid
	WH11	<ul style="list-style-type: none"> Receptacle bins would be provided for the disposal of concrete and mortar slurries, paints, acid washings, hazardous waste and general waste generated by construction workers. 	TransGrid
	WH12	<ul style="list-style-type: none"> The design of the oil containment system would mitigate potential contamination seepages into groundwater. 	Substation Contractor
	WH13	<ul style="list-style-type: none"> Oil handling would be in accordance with TransGrid's procedure <i>Oil Management in Substations (GM EN G2 001)</i>. 	TransGrid
Traffic and Access			
Construction	TA1	<ul style="list-style-type: none"> A Traffic Management Plan (TMP) would be prepared as part of the CEMP to manage traffic, parking and potential cycleway/pedestrian path closures generated by the construction phase of the proposed substation. Mitigation measures in the TMP would include: <ul style="list-style-type: none"> Time and load restrictions on construction vehicles and trucks entering and leaving the work site. Load restrictions would be determined by the Contractor; Measures to protect Holroyd City Council foot paving, kerbing and guttering; Designated parking areas within the boundaries of the proposed substation site to minimise disruption to other road users and the public on Hyland Road and the adjacent cycleway/pedestrian path; Consultation measures to advise residents at 1, 3 and 5 Hyland Road as well as users of the Hyland Road Youth Club Hyland Road Rifle Range and Pigeon Club share facilities of any road closures or disruption to access or parking during the construction phase; A vehicle turning analysis to determine whether road widening works would be required on Hyland Road.; and Pedestrian management (including the management of cyclists). 	Substation Contractor
	TA2	<ul style="list-style-type: none"> Consultation with the RTA to determine the appropriate transport route for the transformer deliveries and preparation of a TMP to outline measures to reduce potential impacts on traffic associated with transporting the transformers to the proposed substation site. 	Transformer Contractor
	TA3	<ul style="list-style-type: none"> Approval from the Holroyd City Council under Section 138 of the Roads Act would be sought for any works on Hyland Road, which is classed as a local road. 	Substation Contractor
	TA4	<ul style="list-style-type: none"> If required, repairs would be made to kerbs, gutters and asphalt pavement along Hyland Road following delivery of transformers. 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
	TA5	<ul style="list-style-type: none"> Ensure vehicles transporting SF6 as well as the driver are licensed under the <i>Road and Rail Transport (Dangerous Goods) Act 1997</i>. 	Substation Contractor
Operation	TA7	<ul style="list-style-type: none"> Transport of SF6 would be in accordance with TransGrid's procedure Management of SF6 Gas (GM AS S2 017) 	TransGrid
Air Quality			
Construction	AQ1	<ul style="list-style-type: none"> Suitable controls would be implemented for stockpiles and unsealed construction areas that are exposed for more than 24 hours, such as covering or spraying with water. 	Substation Contractor
	AQ2	<ul style="list-style-type: none"> Construction vehicles would be restricted to stabilised or sealed ground surfaces as far as practicable to reduce dust generation and sediment tracking on local roads. 	Substation Contractor
	AQ3	<ul style="list-style-type: none"> Appropriate vehicle speed limits would be established and enforced to minimise dust generation. Speed limits would be included in the TMP. 	Substation Contractor
	AQ4	<ul style="list-style-type: none"> Vehicle loads containing loose materials would be covered. 	Substation Contractor
	AQ5	<ul style="list-style-type: none"> Consideration would be afforded to ceasing dust generating works during high wind. 	Substation Contractor
	AQ6	<ul style="list-style-type: none"> Complaints regarding dust and exhaust emissions would be immediately addressed with the implementation of additional controls if warranted. 	Substation Contractor
	AQ7	<ul style="list-style-type: none"> Exposed ground surfaces would be stabilised and rehabilitated as soon as practicable in accordance with the Blue Book (Landcom 2004). 	Substation Contractor
	AQ8	<ul style="list-style-type: none"> Vegetation clearing and disturbance would be minimised where practicable. 	Substation Contractor
	AQ9	<ul style="list-style-type: none"> Work vehicles/machinery would not be left running or idling when not in use. 	Substation Contractor
	AQ10	<ul style="list-style-type: none"> The Contractor would ensure that SF6 gas bottles are secure during transportation and while in storage onsite to reduce risk of damage to the bottles and potential gas leaks. 	Substation Contractor
Operation	AQ11	<ul style="list-style-type: none"> A hazard analysis would be undertaken by TransGrid during the detailed design phase of the proposed substation to identify incidents that could lead to a release of SF6 and the development of an asphixiant concentration. An Emergency Response Plan would be developed for the proposed substation would be implemented in the event of an SF6 leak. 	TransGrid
	AQ12	<ul style="list-style-type: none"> Transport, storage and use of SF6 gas would be in accordance with TransGrid's procedure for the <i>Management of SF6 Gas (GM AS S2 017)</i>. 	TransGrid
	AQ13	<ul style="list-style-type: none"> Safe procedures and work practices would be followed in accordance with TransGrid's <i>Management of SF6 Gas (GM AS S2 017)</i> during handling of the switchgear to limit the potential for a spill of SF6 gas into the atmosphere. 	TransGrid

Impact	Ref #	Proposed Mitigation Measures	Responsibility
Noise and Vibration			
Construction	NV1	<ul style="list-style-type: none"> Construction activities would take place during recommended standard working hours (7.00am to 6.00pm Monday to Friday, 8.00am to 1.00pm Saturday and no work on Sunday or public holidays). Any work outside of these hours would be undertaken in accordance with the DECCW Interim Construction Noise Guidelines (DECCW 2009). 	Substation Contractor
	NV2	<ul style="list-style-type: none"> If after hours or night time work is required (i.e. for transformer deliveries), the Holroyd City Council and other potentially affected residents and community members would be notified by letter at least 24 hours prior. The letter would include details of the location, duration and hours of construction, and contact names and numbers for enquiries and complaints. 	Substation Contractor
	NV3	<ul style="list-style-type: none"> Regular community notifications would be distributed to noise-affected properties to advise on upcoming works. 	Substation Contractor
	NV4	<ul style="list-style-type: none"> A complaints register would be maintained to log all noise related complaints and the response to the complaint. 	Substation Contractor
	NV5	<ul style="list-style-type: none"> Plant and equipment would be turned off when not in use 	Substation Contractor
	NV6	<ul style="list-style-type: none"> All plant and equipment would be regularly maintained. 	Substation Contractor
Operation	NV7	<ul style="list-style-type: none"> Consideration would be given to the incorporation of noise barriers to the north and east or around the reactors during the detailed design process. 	Substation Contractor
	NV8	<ul style="list-style-type: none"> Equipment would be regularly and effectively maintained. 	TransGrid
Electromagnetic Fields			
Construction	-	<ul style="list-style-type: none"> Nil 	-
Operation	EMF1	<ul style="list-style-type: none"> The substation would be designed in line with guidelines and principles for equivalent facilities to minimise the risk of EMF for staff and members of the public. Should areas of the substation not comply with the relevant guidelines, signs would be erected to ensure TransGrid staff are aware of the risks. 	Substation Contractor
	EMF2	<ul style="list-style-type: none"> Place appropriate security around EMF emitting structures. 	Substation Contractor
	EMF3	<ul style="list-style-type: none"> TransGrid would adopt a careful approach to EMF management and would: <ul style="list-style-type: none"> Closely monitor ongoing research and reviews by scientific panels, and overseas policy developments; Continuously review EMF policies and practices; Measure field strengths of EMF, where appropriate; and Promote employees' awareness and provide information on request to interested people. 	TransGrid
	EMF4	<ul style="list-style-type: none"> TransGrid procedures associated with both power frequency electric and magnetic fields and radio frequency electromagnetic fields would be complied with. 	TransGrid
Waste Management and Minimisation			
Construction	W1	<ul style="list-style-type: none"> All wastes would be stored securely whilst onsite to prevent pollutants escaping. 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
	W2	<ul style="list-style-type: none"> Arrangements would be made for waste receptacles to be emptied when 80 per cent full. 	Substation Contractor
	W3	<ul style="list-style-type: none"> The proposed substation site would be kept free of litter at all times. 	Substation Contractor
	W4	<ul style="list-style-type: none"> The proposed substation site would be left clean and free of waste materials and debris at the completion of the construction phase. 	Substation Contractor
	W5	<ul style="list-style-type: none"> A Waste Management Plan (WMP) would be developed for the construction phase of the proposed substation which would be incorporated into the CEMP. The WMP would be prepared in accordance with the Waste Avoidance and Resource Recovery Act 2001; Protection of the Environment Operations Act 1997, DECCW Waste Classification Guidelines (DECCW 2009) and TransGrid's <i>Waste Management Procedure (GD EN G3 023)</i>. 	Substation Contractor
	W6	<ul style="list-style-type: none"> The WMP would include a requirement to complete a Waste Removal Register to document types, volumes and classifications of wastes generated, the fate of the materials (i.e. if the materials were reused, recycled or disposed of) and the locations of the re-use and disposal sites. 	Substation Contractor
	W7	<ul style="list-style-type: none"> Total tonnages of waste recycled and disposed of would be reported to TransGrid at the completion of the construction phase in accordance with the Waste Reduction and Purchasing Policy (WRAPP) (DECCW 1997) reporting requirements. 	Substation Contractor
	W8	<ul style="list-style-type: none"> The WMP would address waste impacts generated by construction works including demolition material, excess construction materials, excavated soil, hazardous materials, green waste, human waste and domestic waste. Where practicable, the WMP would incorporate mitigation measures for the following waste streams to minimise the waste generated: <ul style="list-style-type: none"> Demolition materials <ul style="list-style-type: none"> Off-site recycling and/or reuse of demolition materials including bricks, concrete, timber, steel, iron, aluminium and copper; and Segregation of demolition materials onsite (e.g. timber and steel) to maximise the reuse and recycling potential. Excess construction materials <ul style="list-style-type: none"> Ensure correct quantities are ordered and delivered to the proposed substation site; The use of recycled materials would be investigated, including concrete and other construction materials; Wash-down of concrete trucks would not be conducted on site unless suitable facilities are provided; Wastes would be securely stored in appropriate receptacles or contained areas; and Materials unsuitable for re-use would be transported off-site and disposed of at appropriately licensed management waste management or recycling facilities. Wastes would be tested and classified before disposal, in accordance with requirements of the licensed waste disposal facility. Excavated soil <ul style="list-style-type: none"> Any contaminated material would be managed in 	Substation Contractor

Impact	Ref #	Proposed Mitigation Measures	Responsibility
		<p>accordance with the RAP as well as DECCW's Waste Classification Guidelines (DECCW 2008);</p> <ul style="list-style-type: none"> ▫ The removal, handling or disposal of asbestos would be undertaken by an appropriately licensed contractor as per the Code of Practice for the Safe Removal of Asbestos and Code of Practice for the Management and Control of Asbestos in Workplaces; ▫ Only clean excavated fill material would be used as construction fill; and ▫ Where practicable, topsoil would be stockpiled onsite for future reuse in landscaping activities. <p>– Green waste</p> <ul style="list-style-type: none"> ▫ All noxious weeds and exotic plant species removed would be bagged and disposed of at a licensed landfill facility; and ▫ Where practicable, any vegetation removed from the proposed substation site would be mulched for later reuse in landscaping activities. <p>– Human waste</p> <ul style="list-style-type: none"> ▫ Portable toilet facilities would be provided during the construction phase. Facilities would be regularly maintained and wastes would be disposed of by a licensed waste contractor in accordance with Waste Classification Guidelines (DECCW 2009b). <p>– Domestic waste</p> <ul style="list-style-type: none"> ▫ Recycling facilities would be provided to encourage the separation and recycling of all paper, aluminium, glass, and plastic products used during construction phase; and ▫ All domestic waste would be collected regularly and disposed of at licensed facilities as appropriate. 	
Operation	W9	<ul style="list-style-type: none"> • An Emergency Response Plan (ERP) would include measures to respond to a SF6 leak. 	TransGrid
	W10	<ul style="list-style-type: none"> • General garbage generated by maintenance personnel would be managed in accordance with TransGrid's procedure for <i>Waste Management (GD EN G3 023)</i>. 	TransGrid

8.5. Licences and Approvals

A summary of the licences, approvals and permits that are needed prior to the commencement of the construction and installation of the replacement transformers are outlined in **Table 8-2**

■ Table 8-2 Licence, approvals, permits

Statute	Project implications
<i>Road and Rail Transport (Dangerous Goods) Act 1997</i>	A dangerous goods transport and vehicle licence is required from the RTA for both the vehicle and the driver of the vehicle carrying dangerous goods, including SF6 gas.
<i>Roads Act 1993</i>	The proposal may involve work (widening) on or over a public road and hence approval may be required from Holroyd City Council.

9. Statutory environmental factors

9.1. Clause 228 factors (NSW legislation)

Clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* details those factors that must be taken into account when considering the likely impact of an activity on the environment. Clause 228 considerations for the proposed substation are summarised in **Table 9-1** below.

■ Table 9-1 Compliance with clause 228 factors

Factor (from clause 228)	Impacts	Comments
a. Any environmental impact on the community?	Minor Negative	There would be a visual impact from the proposed substation. The potential impacts have been subject to environmental assessment, and mitigation measures have been provided to minimise negative impacts. If the widening of Hyland Road is required, there may be temporary impacts on users of the cycleway/pedestrian walkway located on the eastern side of Hyland Road. The CEMP would include pedestrian and cyclist management strategies should Hyland Road require widening. The community would be kept informed of proposed substation progress by newsletter updates and notices on the Proponents website.
b. Any transformation of a locality?	Positive and Negative	There would be a transformation of the proposed substation site as a result of the development but this would not result in a large transformation of the locality. The locality is subject to mixed uses at present including residential and industrial use. The proposed substation is part of the wider Western Sydney Supply Project which would provide for future development in the locality, such as the Boral Greystanes Estate Precinct.
c. Any environmental impact on the ecosystems of the locality?	Neutral	The proposed substation would not have any impact on the ecosystems of the locality as any identified impacts from the construction phase would be mitigated.
d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?	Minor Negative	The proposed substation site is in a locality of mixed use and has been subject to disturbance over the long term. The Proposal is unlikely to alter the environmental quality or value of the locality in the long term.
e. Any effect on a locality, place or building having aesthetic, anthropological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?	Minor Negative	Both Indigenous and non-Indigenous heritage assessments were undertaken for the proposed substation. The indigenous heritage of the site was assessed by representatives of the local Indigenous communities, who indicated that the proposed substation would not affect any known indigenous archaeological sites. The non-Aboriginal heritage study showed that the proposed substation would have a visual impact on two items of local significance.
f. Any impact on the habitat of	Minor Negative	The flora and fauna assessment showed that the area

Factor (from clause 228)	Impacts	Comments
any protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?		of the Proposal has been largely cleared of native vegetation in the past and heavily disturbed.
g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?	Short-term negative	The proposed substation would not endanger any species of animal, plant or other life form, whether living on land, in water or in the air.
h. Any long-term effects on the environment?	Positive long-term	Contaminated soil at the proposed substation site would be managed by the Contractor hence posing a long-term positive effect on the environment.
i. Any degradation of the quality of the environment?	Short term negative and long term positive	<p>The proposed substation has the potential to result in the degradation of the environment during the construction phase where risks of erosion, sedimentation, air and noise pollution are greatest. Construction activities have the potential to degrade air, water and acoustic quality of the environment in the short term. These amenity based impacts would stem from the operation of plant and machinery which would give rise to noise and vibration, generate dust and also provide conditions conducive to erosion and sedimentation. These impacts would be for a short term and mitigated by the measures outlined in the CEMP.</p> <p>As noted above, contaminated soil at the proposed substation site would be managed by the Contractor hence posing a long term positive impact on the quality of the environment.</p>
j. Any risk to the safety of the environment?	Neutral	The proposed substation would not result in any risk to the safety of the environment.
k. Any reduction in the range of beneficial uses of the environment?	Neutral	No reduction in the beneficial uses of the environment would be related to the proposed substation.
l. Any pollution of the environment?	Short term negative	The proposed substation has the potential to result in short term pollution of the environment through erosion, sedimentation, spills, noise, vibration and air pollution from construction plant machinery. However, these would be mitigated through the construction environment management plan.
m. Any environmental problems associated with the disposal of waste?	Neutral	Contaminated spoil may be generated during the construction phase. However, the disposal of contaminated soil would be in accordance with the RAP and the DECCW Waste Classification Guidelines. Furthermore, construction methods and mitigation measures would minimise the generation of waste, and reuse or recycle waste where possible.
n. Any increased demands on resources, natural or otherwise which are, or are likely to become, short in supply?	Neutral	The proposed substation would consume a relatively small quantity of resources which would not be in short supply.
o. Any cumulative environmental effect with other existing or likely future activities?	Minor Negative	There is the potential for there to be a cumulative effect from the proposed substation in terms of the timing of the construction and other developments in the area. The construction period would be relatively

Factor (from clause 228)	Impacts	Comments
		short lived and any impacts mitigated through the construction environment management plan.

9.2. EPBC Act 1999 factors (Commonwealth factors)


Actions that have the potential to significantly impact matters of national environmental significance need to be subject to assessment and approval under the provision of the Environment Protection and Biodiversity Conservation Act 1999. Matters of national environmental significance are considered in **Table 9-2**. The assessment found that the Proposal described in this REF is not considered likely to impact significantly on any nationally environmentally significant matters. As such, no referral to the Department of Environment, Water, Heritage and the Arts is required as part of the Proposal.

■ Table 9-2 Compliance with EPBC Act requirements

Matters of national environmental significance	Comments
World heritage properties	The Proposal would not impact upon a world heritage property or area.
National heritage places	The Proposal would not impact upon any national heritage places.
Ramsar wetlands	The Proposal is not located within the vicinity of a Ramsar listed wetland and therefore there would be no impacts.
Listed threatened species or ecological communities	There are no threatened ecological communities or species that would be impacted by the proposed substation.
Migratory species	It is unlikely that highly mobile Commonwealth listed migratory species would use the study area as a habitat and therefore there is considered to be no impact upon these species.
Commonwealth marine areas	There are no Commonwealth marine areas within the vicinity of the substation site.
Nuclear actions	The Proposal would not involve any nuclear actions.
Commonwealth land	The Proposal is not located near any Commonwealth lands.

10. Certification

This Review of Environmental Factors provides a true and fair review of the Proposal in relation to its potential effects on the environment. It addresses, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

Name	Jonas Ball
Signed	
Designation	Project Manager
Organisation	Sinclair Knight Merz
Date	4 June 2010

I have examined this Review of Environmental Factors and the certification by Jonas Ball of Sinclair Knight Merz and accept the Review of Environmental Factors on behalf of TransGrid.

Name	
Signed	
Designation	
Organisation	TransGrid
Date	

11. Conclusion

This Review of Environmental Factors has been prepared in accordance with Part 5 of the *Environmental Planning and Assessment Act 1979* and the *Environmental Planning and Assessment Regulation 2000*. It is concluded that the proposed substation is unlikely to significantly affect threatened species, populations or ecological communities, or their habitats. Furthermore, the proposed development is not expected to cause any significant long-term impacts associated with noise, soils, hydrology, Indigenous and non-Indigenous heritage, roads and traffic, land use and social impacts, hazards and risks, and visual impacts, as a result of construction and subsequent operation of the proposed development.

The proposed substation is likely to cause some temporary impacts during the construction phase of the development and some visual impact once operational.

These impacts would be mitigated with the implementation of the mitigation measures outlined in **Section 8** and through the implementation of the CEMP.

The establishment of the proposed substation in the Holroyd area, would reduce electricity supply constraints within the Sydney Metropolitan area and the potential for major overloading and peak load electrical outages.

12. References

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