Granville Junction Substation
Review of Environmental Factors

OCTOBER 2015
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Appendix C – Flora, fauna and arborist assessment
Appendix D – Noise and vibration assessment
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## Glossary of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers</td>
<td>Manually or automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. The basic function is to detect a fault condition and interrupt current flow.</td>
</tr>
<tr>
<td>dB(A)</td>
<td>Decibel expressed with the frequency weighting filter used to measure ‘A-weighted’ sound pressure levels, which conforms more or less to the human ear response, as our hearing is less sensitive at low and high frequencies.</td>
</tr>
<tr>
<td>DCCB</td>
<td>Direct current circuit breaker.</td>
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</tbody>
</table>
| Feeders               | In the context of the Power Supply Upgrade Program, a feeder is either:  
  - a 33 kilovolts AC cable coming in to the substation from the Sydney Trains supply or from Ausgrid  
  - a cable supplying 1500 volts DC from the traction substation to the overhead wiring system. |
| $L_{A90}(\text{period})$ | The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise e.g. $L_{A90}(15 \text{ min})$. |
| $L_{A\text{eq}(\text{period})}$ | Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring. |
| Possession (rail track) | A period during which the rail line is shut down to allow for planned maintenance, construction works etc.                                      |
| Proposal              | Refers to the construction and operation of Granville Junction Substation, including the associated installation of high voltage feeder cabling to/from the substation, and the decommissioning and removal of the existing Granville Substation. |
| Proposal site         | The immediate location of the proposal, which is the area that has the potential to be directly disturbed by construction.                      |
| Rectifiers            | An electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification. |
| Study area            | Consists of land in the vicinity of the proposal site, including land that has the potential to be indirectly impacted by the proposal.          |
| Sydney Trains         | Sydney Trains provides train services throughout the Sydney CBD and metropolitan area.                                                   |
| Traction substation   | A traction substation is an electrical substation that converts electric power from the form provided by the electricity provider to an appropriate voltage, current type and frequency which can be used to supply the rail network with power. |
**List of abbreviations**

<table>
<thead>
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<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ASA</td>
<td>Transport for NSW Asset Standards Authority</td>
</tr>
<tr>
<td>CEMP</td>
<td>Construction Environmental Management Plan</td>
</tr>
<tr>
<td>CTMP</td>
<td>Construction Traffic Management Plan</td>
</tr>
<tr>
<td>DC</td>
<td>direct current</td>
</tr>
<tr>
<td>DSAPT</td>
<td>Disability Standards for Accessible Public Transport 2002</td>
</tr>
<tr>
<td>EME</td>
<td>electromagnetic energy</td>
</tr>
<tr>
<td>EP&amp;A Act</td>
<td><em>Environmental Planning and Assessment Act 1979</em></td>
</tr>
<tr>
<td>EPA</td>
<td>Environment Protection Authority</td>
</tr>
<tr>
<td>EPBC Act</td>
<td><em>Environment Protection and Biodiversity Conservation Act 1999</em></td>
</tr>
<tr>
<td>EPL</td>
<td>environment protection licence</td>
</tr>
<tr>
<td>GHD</td>
<td>GHD Pty Ltd</td>
</tr>
<tr>
<td>HV</td>
<td>high voltage</td>
</tr>
<tr>
<td>Infrastructure SEPP</td>
<td><em>State Environmental Planning Policy (Infrastructure) 2007</em></td>
</tr>
<tr>
<td>kilovolts</td>
<td>Kilovolt</td>
</tr>
<tr>
<td>LGA</td>
<td>local government area</td>
</tr>
<tr>
<td>m²</td>
<td>square metre</td>
</tr>
<tr>
<td>m</td>
<td>Metre</td>
</tr>
<tr>
<td>MW</td>
<td>Megawatt</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>POEO Act</td>
<td><em>Protection of the Environment Operations Act 1997</em></td>
</tr>
<tr>
<td>PSU Program</td>
<td>Power Supply Upgrade Program</td>
</tr>
<tr>
<td>REF</td>
<td>Review of Environmental Factors</td>
</tr>
<tr>
<td>RMS</td>
<td>Roads and Maritime Services (formerly Roads and Traffic Authority (RTA))</td>
</tr>
<tr>
<td>TSC Act</td>
<td><em>Threatened Species Conservation Act 1995</em></td>
</tr>
<tr>
<td>V</td>
<td>volt</td>
</tr>
</tbody>
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Executive summary

Overview

This Review of Environmental Factors (REF) considers the potential impacts of the construction and operation of a new substation at Granville. It has been prepared by GHD Pty Ltd on behalf of Transport for NSW to assess the potential impacts of the proposal, and assist Transport for NSW determine the proposal in accordance with the provisions of Part 5 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

Why is the proposal needed?

Transport for NSW is currently undertaking the Power Supply Upgrade Program (the PSU Program) to meet the actual and projected increase in power demands on the Sydney Trains electrical network. A power supply study undertaken as part of the program found that a new substation was required in the Granville area to:

- provide additional capacity on the North Shore, Northern and Western Line; and on the Airport, Inner West and South Line
- allow for the decommissioning and removal of the existing Granville Substation, which has reached the end of its recommended operational life.

Where would the proposal be located?

The site for the proposed substation is located on the northern side of Railway Parade adjacent to the rail corridor, about 420 metres north-west of Granville Station. The existing substation site is located to the north of the site for the proposed substation, in the triangle of land where the North Shore, Northern and Western Lines, and the Airport, Inner West and South Lines diverge (known as ‘Granville Junction’).

What would the proposal involve?

The proposal involves constructing and operating a new substation. The proposed substation would supply traction power to the Sydney Trains rail network. The substation would include electrical equipment and connections (including above ground cabling in steel troughs, overhead wiring, an under track crossing and a single over track crossing structure), as well as an administration office, staff amenities and parking.

The proposed substation would be accessed directly via a new access off Railway Parade. Connections to the existing power, wastewater, potable water and stormwater drainage network would be provided.

The proposal also involves decommissioning and removing the existing Granville substation.

How long would the proposal take to construct?

Construction is scheduled to commence in mid to late 2016 and continue for about 12 months. Civil works would be undertaken over the first nine months, with electrical and services fit-out undertaken over the following three months. Commissioning would then take about six months.
Summary of REF findings

There are not considered to be any significant long-term environmental issues associated with the presence of the substation on the proposal site, or its operation. In the short-term, there may be minor adverse impacts associated with construction. Key issues identified include:

- potential short-term noise impacts during construction
- temporary loss of about four on-street parking spaces on Railway Parade
- removal of three trees for the new site access
- management of potential hazardous materials.

Operational impacts include:

- the presence of a new structure in the landscape, which would be visible to passing traffic and pedestrians, and from some residences opposite the site on Railway Parade
- loss of two on-street parking spaces on Railway Parade.

The design of the proposal, and the proposed form and finishes, has taken the visibility of the proposal site into account.

The proposal would result in long-term positive impacts as it would increase the capacity of the rail corridor’s power supply network, enabling it to meet the projected increase in power demands on the rail network. This would provide long term benefits to users of the rail network.

Adverse environmental impacts would be minimised by implementing the mitigation measures listed in this REF, including preparing and implementing a construction environmental management plan.

Justification and conclusion

The proposal is needed to meet the actual and projected increase in power demands on the Sydney Trains electrical network.

The potential environmental impacts of the proposal have been assessed in accordance with section 111 of the EP&A Act, Clause 228 of the Environmental Planning and Assessment Regulation 2000, the Threatened Species Conservation Act 1995, and the Environment Protection and Biodiversity Conservation Act 1999. It is considered that the adverse environmental impacts would be mainly short-term and localised in nature. With the adoption and implementation of the mitigation and management measures listed in this REF, the potential environmental impacts of the proposal would be adequately mitigated and managed, and are not considered to be significant.
1. Introduction

1.1 Overview

Transport for NSW is currently undertaking the Power Supply Upgrade Program (the PSU Program) to meet the actual and projected increase in power demands on the Sydney Trains electrical network. A power supply study undertaken as part of the program found that a new junction substation was required in the Granville area to provide additional capacity and improve reliability for the operation of trains along the North Shore, Northern and Western Lines, and the Airport, Inner West and South Lines.

As part of the PSU Program, Transport for NSW is proposing to construct a new junction substation next to the rail corridor at Granville to address the traction power needs identified by the power supply study.

The construction and operation of Granville Junction Substation, and the decommissioning and removal of the existing Granville Substation (referred to as ‘the proposal’ for the purposes of this document) is subject to assessment and determination under Part 5 of the NSW Environmental Planning and Assessment Act 1979 (the EP&A Act). Transport for NSW commissioned GHD Pty Ltd (GHD) to assess the potential environmental impacts of the proposal, and prepare a Review of Environmental Factors (REF) in accordance with the EP&A Act.

1.2 The Power Supply Upgrade Program

The PSU Program was initiated in 2005 to ensure that Sydney’s rail network would be capable of meeting the expected power requirements of future train timetables, and the requirements of the new generation of air conditioned trains. The PSU Program involves constructing new electrical infrastructure and upgrading substations, sectioning huts, overhead wiring and electrical feeders across the network.

The objectives of the PSU Program are to:

- support the introduction of air conditioned trains into service
- provide additional power to operate trains on the network
- improve service reliability by reducing the risk of disruption to rail services.

1.3 The proposal

The proposal involves constructing and operating a new substation on a site owned by Transport for NSW, which is located adjacent to the rail corridor (for the Airport, Inner West and South Lines) on Railway Parade in the suburb of Granville. The substation would include electrical equipment and connections (including above ground cabling in steel troughs, overhead wiring, an under track crossing and a single over track crossing structure), as well as an administration office, staff amenities and parking.

The proposal also involves the decommissioning and removal of the existing Granville Substation.

The location of the proposal is shown in Figure 1.1. A description of the proposal is provided in section 5.
Figure 1.1 Location of the proposal
1.4 Structure of the REF

The structure and content of the REF is summarised in Table 1.1.

Table 1.1 Structure and content of the REF

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
<tr>
<td>Section 1 – Introduction</td>
<td>An introduction to the REF.</td>
</tr>
<tr>
<td>Section 2 – Location and setting</td>
<td>A description of the location, site and study area.</td>
</tr>
<tr>
<td>Section 3 – Statutory framework</td>
<td>An overview of the statutory requirements for the proposal, including the requirements of relevant environmental planning instruments and legislation.</td>
</tr>
<tr>
<td>Section 4 – Strategic context, need and options considered</td>
<td>An overview of the strategic context for the proposal, need, and the proposal development process.</td>
</tr>
<tr>
<td>Section 5 – Description of the proposal</td>
<td>A description of the proposal.</td>
</tr>
<tr>
<td>Section 6 – Community and stakeholder consultation</td>
<td>A summary of the consultation process and the key issues raised.</td>
</tr>
<tr>
<td>Section 7 – Environmental impact assessment</td>
<td>An assessment of the potential environmental impacts, including summaries of specialist reports prepared for the proposal.</td>
</tr>
<tr>
<td>Section 8 – Environmental management and mitigation</td>
<td>An outline of the requirements for the proposal’s environmental management plan, and a summary of the mitigation measures identified by the REF.</td>
</tr>
<tr>
<td>Section 9 - Conclusion</td>
<td>A conclusion to the REF.</td>
</tr>
<tr>
<td>Section 10 – Reference list</td>
<td>A list of references for the REF.</td>
</tr>
</tbody>
</table>

1.5 Scope and methodology

1.5.1 Scope and purpose of the REF

For an activity subject to Part 5 of the EP&A Act, section 111 of the Act imposes a duty on a determining authority to ‘examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity’. Determining authorities make a determination about whether a proposal can proceed, and on what basis.

The purpose of this REF is to summarise the results of the environmental impact assessment for the proposal and provide information about the proposal as an input to the determination process. Transport for NSW (as the determining authority) will consider the findings of the REF as part of the determination process.

In summary, the REF will assist Transport for NSW to undertake the following:

- determine whether the proposal should be approved, taking into account to the fullest extent possible all matters affecting or likely to affect the environment (in accordance with section 111 of the EP&A Act)
- determine whether the proposal is likely to have a significant effect on the environment or significantly affect threatened species, populations or ecological communities or their habitats
• develop appropriate conditions (based on the mitigation measures within the REF) to be attached to any approval granted.

Clause 228 of the Environmental Planning and Assessment Regulation 2000 (the Regulation) lists, for the purposes of Part 5 of the EP&A Act, the factors to be taken into account when considering the likely impact of an activity on the environment. Appendix A considers the potential impacts of the proposal against these factors.

1.5.2 Definitions used

For the purposes of this REF, the following definitions have been applied:

• The ‘proposal’ refers to the construction and operation of the Granville Junction Substation and the decommissioning and removal of the existing Granville Substation.

• The ‘proposed substation’ refers to the proposed Granville Junction Substation.

• The ‘proposal site’ includes:
  – the ‘site for the proposed substation’ - the site on Railway Parade where the proposed substation would be constructed and operated
  – services locations – the location of high voltage and communications cabling (both above and below ground) associated with the proposed substation
  – the ‘existing substation site’ – the site at Granville Junction where the existing Granville Substation is located.

• The ‘study area’ consists of land in the vicinity of, and including, the proposal site. The study area is the wider area surrounding the proposal site, including land that has the potential to be indirectly impacted by the proposal (for example, as a result of any noise impacts).

Other terms are defined in the glossary at the beginning of the REF.

1.5.3 Methodology

Preparing the REF has involved the following tasks:

• attending project meetings

• receiving relevant information from Transport for NSW

• site visits, including a site visit and proposal review by a GHD ecologist/arborist, and a GHD traffic engineer

• consultation and liaison with key stakeholders

• undertaking specialist noise and vibration; flora, fauna and arborist; and sustainability assessments

• reviewing specialist assessments being undertaken as part of the design process (including the contamination, geotechnical and electromagnetic fields assessments), and incorporating relevant information in the REF

• preparing photomontages of the proposed substation

• a qualitative desktop assessment of other potential environmental and social impacts, including reviews of existing information and database searches

• identifying mitigation measures to manage the impacts identified

• addressing the requirements of Part 5 of the EP&A Act and Clause 228 of the Regulation.
The REF has been prepared in consultation with relevant stakeholders, including the design team (GHD), Transport for NSW, and other relevant technical advisors and agencies. It is noted that although the REF team has consulted with members of the design team to prepare the REF, design personnel have not influenced the methodology or outcomes of the environmental impact assessment process in any way.
2. Location and setting

This section provides information on the location of the proposal, the proposal site and its surrounds (the study area).

2.1 Site location and description

The site for the proposed substation (shown in Figure 1.1) is located in the Parramatta local government area (LGA). The site occupies part of lot 2 on deposited plan (DP) 1006002. The site is located on the northern side of Railway Parade opposite the intersection with The Avenue, about 420 metres north-west of Granville Station. The site adjoins the rail corridor (for the Airport, Inner West and South Lines). The site for the proposed substation consists of the potential footprint for the substation building and surrounding facilities/hardstand areas. The site has an area of about 1,800 square metres, and approximate dimensions of 38 by 48 metres.

The site has been subject to previous disturbance and development. Buildings previously located on site have been removed, with hardstand and some building rubble remaining on site.

The existing substation site is located to the north of the site for the proposed substation, in the triangle of land where the North Shore, Northern and Western Lines, and the Airport, Inner West and South Lines diverge (known as 'Granville Junction'). The existing Granville Substation is located in the Holroyd LGA (the rail lines are the boundary between the LGAs) on land owned by Transport for NSW.

Connections to the Sydney Water potable water and wastewater networks, and Council's stormwater drainage network, would be located within Railway Parade and the rail corridor (as described in section 5.1.6).

Vehicular and pedestrian access to the proposal site during construction would be from Railway Parade via a new proposed driveway on the eastern side of the site. During operation, access would also be via this new driveway off Railway Parade.

2.2 The study area and site context

Key features of the study area are shown on Figure 2.1. The proposal site is located in an area which includes a mix of transport, residential (mostly detached dwellings) and commercial land uses.

Land uses immediately surrounding/adjoining the site for the proposed substation include:

- railway uses (rail corridor) to the north and north-east
- Sydney Trains Major Works Depot to the west
- Sydney Trains Central and Western Possessions Office to the east
- Railway Parade to the south.

There is a bus stop for the M91 Hurstville to Parramatta route located outside the site on the northern side of Railway Parade. Further information on the M91 route is provided in section 7.5.2.

Land uses in the broader area include:

- Residential land uses - includes both detached and medium density residential dwellings to the south of the proposal site. The nearest residences are located directly opposite the site on the southern side of Railway Parade.
• Commercial/light industrial land uses – various commercial and light industrial land uses are located to the north, east and west of the site. The Granville town centre is located about 200 metres to the south-east of the site. Light industrial uses are located to the north of the rail corridor, in the area roughly bounded by the rail corridor, Parramatta Road and Bold Street.

• Education uses – Granville Boys High School, Granville Public School and the Granville College of Technical and Further Education (Granville TAFE) are located within about 500 metres south of the site.
Figure 2.1 Land use and key features of the study area
3. **Statutory framework**

*This section provides an overview of the statutory framework relevant to the proposal, including the assessment requirements, relevant environmental legislation and planning instruments.*

### 3.1 Environmental Planning and Assessment Act 1979

The EP&A Act and the Regulation provide the statutory basis for planning and environmental assessment in NSW. The EP&A Act provides the framework for environmental planning and development approvals and includes provisions to ensure that the potential environmental impacts of a development are assessed and considered in the decision making process.

#### 3.1.1 Application of Part 5 of the EP&A Act

As a result of the application of the *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP), the proposal is subject to Part 5 of the EP&A Act (refer section 3.2.1). In relation to Part 5 activities, section 111 of the EP&A Act imposes a duty on a determining authority to ‘examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity’.

Section 110(1) defines a determining authority as ‘a Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out’.

In line with Clause 79 of the Infrastructure SEPP, Transport for NSW is the proponent and determining authority for the proposal. This REF has been prepared to satisfy Transport for NSW’s requirements under the EP&A Act.

### 3.2 Environmental planning instruments

The environmental planning instruments that are relevant to the approval and assessment of the proposal are considered below.

#### 3.2.1 State environmental planning policies (SEPPs)

**State Environmental Planning Policy (Infrastructure) 2007**

The Infrastructure SEPP outlines the permissibility and development controls for infrastructure works and facilities. Clause 79 of the Infrastructure SEPP outlines which railway infrastructure facilities are permissible without the need for development consent under the EP&A Act. As the proposal meets the definitions of rail infrastructure facilities provided by clause 78, it is permissible without consent.

Clauses 13 to 16 of the Infrastructure SEPP outline the requirements for consultation with councils and other public authorities for infrastructure development carried out by or on behalf of a public authority. The proposal would not trigger any of these requirements, and therefore consultation with Parramatta and Holroyd councils and other public authorities is not required under the Infrastructure SEPP. However, relevant agencies have been, and will continue to be, consulted in relation to the proposal. Further details of the consultation process are provided in section 6.
3.2.2 Local environmental plans

The Parramatta Local Environmental Plan 2011 (the Parramatta LEP) applies to the land in which the site for the proposed substation is located. This site is located within land zoned as B6 Enterprise Corridor. The Holroyd Local Environmental Plan 2013 (the Holroyd LEP) applies to the land in which the existing substation site is located. This site is located within land zoned as SP2 Infrastructure. The zone provisions for both zones provide that the proposal can be carried out in these zones with consent.

However, clause 5.12 of the LEPs states that ‘…this Plan does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, by or on behalf of a public authority, that is permitted to be carried out with or without development consent, or that is exempt development, under State Environmental Planning Policy (Infrastructure) 2007’. As the proposal is permitted without consent under the Infrastructure SEPP, the consent requirements of the LEPs do not apply to the proposal.

3.3 Other legislative considerations

3.3.1 NSW legislation

Other environmental legislation that is directly relevant to the approval and/or assessment of the proposal is considered in Table 3.1.

Table 3.1 Consideration of relevant legislation

<table>
<thead>
<tr>
<th>Act</th>
<th>Potential approval requirement for rail infrastructure</th>
<th>Relevance to the proposal</th>
</tr>
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<tbody>
<tr>
<td>Protection of the Environment Operations Act 1997 (POEO Act)</td>
<td>An environment protection licence (EPL) is required for scheduled activities or scheduled development work.</td>
<td>The proposal is not considered to be a scheduled activity under Schedule 1 of the POEO Act and therefore an EPL is not required for construction. Sydney Trains currently holds an EPL for the operation of the rail network (EPL no. 12208). The proposal would comply with the requirements of this licence as well as the general obligations of the POEO Act. No variation of this licence is considered to be required.</td>
</tr>
<tr>
<td>Roads Act 1993</td>
<td>Approval under section 138 for works to a public road</td>
<td>The proposal includes provision of driveway access to the site from Railway Parade (an unclassified road). Under Clause 5(1) of Schedule 2, a public authority is not required to obtain a roads authority’s consent for the exercise of the authority’s functions in, on or over an unclassified road. The access would be designed in accordance with the requirements of the Transport for NSW Asset Standards Authority (ASA) standard for access roads (Transport for NSW, 2014) and in consultation with Parramatta City Council.</td>
</tr>
<tr>
<td>National Parks and Wildlife Act 1974</td>
<td>A heritage impact permit under section 87 of the Act to harm or desecrate an Aboriginal heritage object.</td>
<td>There are no listed Aboriginal heritage items or places located on or in the vicinity of the site. As a result of the existing levels of site disturbance, there is minimal likelihood that unknown items of Aboriginal heritage significance would be present. Further information is provided in section 7.8.</td>
</tr>
<tr>
<td>Act</td>
<td>Potential approval requirement for rail infrastructure</td>
<td>Relevance to the proposal</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Water Management Act 2000 and Water Act 1912</td>
<td>Licence for dewatering and interception of groundwater</td>
<td>Minor excavation work would be undertaken as part of the proposal, and it is possible that groundwater would be intercepted. Subject to confirmation with the Department of Primary Industries - Water, if Transport for NSW (as determining authority) determines that the proposal is a ‘defined minimal impact aquifer interference activity’, a license would not be required. Potential impacts on groundwater associated with the construction and operation of the proposal are considered in section 7.1.2.</td>
</tr>
<tr>
<td>Heritage Act 1977</td>
<td>Approval under section 57(1) for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. An excavation permit under section 139 to disturb or excavate any land containing or likely to contain a relic.</td>
<td>There are no listed heritage items located within or in the vicinity of the proposal site. The nearest listed heritage item is located about 120 metres south-east of the proposal site. As a result of the existing levels of site disturbance, there is minimal likelihood that unknown items of historic significance or relics would be present. Further information is provided in section 7.8.</td>
</tr>
<tr>
<td>Threatened Species Conservation Act 1995 (TSC Act)</td>
<td>The TSC Act lists threatened species, populations or ecological communities to be considered in deciding whether there is likely to be a significant impact on threatened biota, or their habitats. If any of these could be impacted by the project, an assessment of significance that addresses the requirements of section 5A of the EP&amp;A Act must be completed to determine the significance of the impact.</td>
<td>The proposal site is largely disturbed. The proposal would not result in any impacts to listed flora, fauna or communities, and a species impact statement is not required. Providing access to the site for the proposed substation would involve the removal of three trees from the road verge near the south-eastern boundary of the proposal site. Further information is provided in section 7.2.</td>
</tr>
<tr>
<td>Noxious Weeds Act 1993</td>
<td>Under Part 3 Division 1 of the Act, all private landowners, occupiers, public authorities and Councils are required to control noxious weeds on their land.</td>
<td>During site surveys, one noxious weed and two environmental weeds were observed at the site for the proposed substation. Weeds would be managed and disposed of in accordance with the requirements of the Noxious Weeds Act and/or the Weeds of National Significance: Weed Management Guides. Further information is provided in section 7.2.</td>
</tr>
</tbody>
</table>

### 3.3.2 Australian Government legislation

**Environment Protection and Biodiversity and Conservation Act 1999**

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) protected matters tool was searched on 19 June 2015 for a 1 kilometre radius around the proposal site. The results of the search are summarised in Table 3.2. As no impacts are predicted, an approval under the EPBC Act would not be required.
<table>
<thead>
<tr>
<th>EPBC Act protected matter</th>
<th>Matter located within search radius</th>
<th>Comments</th>
<th>Potential impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Heritage Property</td>
<td>None</td>
<td>The proposal would not impact on any World Heritage properties.</td>
<td>None</td>
</tr>
<tr>
<td>National Heritage Places</td>
<td>None</td>
<td>The proposal would not impact on any National Heritage properties.</td>
<td>None</td>
</tr>
<tr>
<td>Wetlands of international significance (Ramsar sites)</td>
<td>None</td>
<td>The proposal would not impact on any wetlands.</td>
<td>None</td>
</tr>
<tr>
<td>Threatened ecological communities</td>
<td>Two</td>
<td>The proposal would not impact on any threatened ecological communities (refer section 7.2).</td>
<td>None</td>
</tr>
<tr>
<td>Threatened species</td>
<td>23 species including five birds, two frogs, five mammals, ten plant species and one reptile</td>
<td>The proposal is located within a highly disturbed and developed urban area with limited vegetation (native or otherwise) that would provide habitat for threatened and migratory species (refer section 7.2).</td>
<td>None</td>
</tr>
<tr>
<td>Listed migratory species</td>
<td>13 species including one marine bird, seven terrestrial species, five wetlands species</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Nuclear actions</td>
<td>None</td>
<td>The proposal does not involve a nuclear action.</td>
<td>None</td>
</tr>
<tr>
<td>Commonwealth Marine Areas</td>
<td>None</td>
<td>No Commonwealth marine areas are located within the search radius.</td>
<td>None</td>
</tr>
<tr>
<td>Great Barrier Reef Marine Park</td>
<td>None</td>
<td>The Great Barrier Reef Marine Park is outside the search radius.</td>
<td>None</td>
</tr>
<tr>
<td>Commonwealth land</td>
<td>One Commonwealth property</td>
<td>The proposal would not directly or indirectly impact on any Commonwealth land.</td>
<td>None</td>
</tr>
<tr>
<td>A water resource, in relation to coal seam gas development and large coal mining development</td>
<td>Not relevant</td>
<td>Not relevant.</td>
<td>None</td>
</tr>
</tbody>
</table>

### 3.4 Summary of approval requirements

As a result of the application of the Infrastructure SEPP the proposal does not require development consent and it is subject to assessment and determination under Part 5 of the EP&A Act. No additional approvals are required.
4. **Strategic context, need and options considered**

This section provides background information on the strategic and planning context for the proposal, why it is needed, and the options considered.

4.1 **Strategic context and need for the proposal**

4.1.1 **Strategic context**

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) provides a framework for addressing transport challenges across NSW over the next 20 years. The master plan is designed to guide the prioritisation of available funds to deliver maximum benefits to NSW. The master plan includes 220 short, medium and long-term actions that are focused on transforming the NSW transport system.

One of the actions within the master plan is to ‘Expand the Sydney Trains fleet to include modernised double-deck and new single-deck trains’. Within the next 10 years, around 52 per cent of the existing fleet would be replaced, and the size of the fleet would increase by around 28 per cent. This would involve the introduction of new rolling stock, which includes an air conditioned fleet.

The proposal involves the provision of infrastructure required to meet the needs of the expanded Sydney Trains fleet, and is therefore consistent with the master plan.

The *Rebuilding NSW State Infrastructure Strategy* (NSW Government, 2014) has highlighted the importance of sustaining productivity growth in major urban centres and regional communities, as well as supporting population growth toward almost six million people in Sydney and more than nine million people in NSW. The strategy provides the NSW Government’s commitments to investing in new infrastructure, including rail infrastructure improvements.

4.1.2 **Need for the proposal**

To meet the needs of the expanded and air conditioned rail fleet and the operation of the 2018 timetable, an increase in the capacity of the power supply on the Sydney Trains electrical network is required.

A power supply study was undertaken as part of the PSU Program which identified that a new substation was required in the Granville area to:

- provide additional capacity on the North Shore, Northern and Western Line, and the Airport, Inner West and South Line
- allow for the decommissioning and removal of the existing Granville Substation, which has reached the end of its recommended operational life.

4.2 **Proposal development process**

The power supply study identified that the best way to address the identified needs would be to develop a new substation at a new location in Granville.

GHD was engaged by Transport for NSW to prepare pre-concept designs for the proposal. The pre-concept design process involves an options assessment, service searches, a geotechnical
survey and environmental impact assessment. The potential environmental impacts of the proposal are summarised in this REF.

### 4.3 Objectives of the proposal

The objectives of the proposal are to:

- establish a new substation at Granville
- provide additional power supply capacity and improved reliability for the operation of the Sydney rail network
- achieve regulatory compliance and meet all Asset Standards Authority (includes RailCorp standards) and Australian Standards.

### 4.4 Options considered

A summary of the main options considered as part of the development of the proposal is provided below. It is noted that the potential traffic and transport implications of the options have been based on a preliminary review by a traffic engineer. No design measurements or detailed analysis of options has been undertaken.

**The ‘do nothing’ option**

The ‘do nothing’ option involves not undertaking the proposal. Under this option, no new substation would be constructed at Granville. This option is not considered to be acceptable, as it would result in the Sydney Trains electrical network not being able to meet the needs described in section 4. Studies have already shown that the existing power supply network cannot meet the future needs of the Sydney Trains network.

The options considered below mainly relate to the proposed substation and the site for the proposed substation.

#### 4.4.1 Site location options

**Location option 1 – Existing substation site**

Granville Substation needs to remain operational until the proposal commences operation. The existing substation site does not have sufficient available space to accommodate the proposed substation along with the existing substation. The site contains underground high voltage cables. It is also located next to a concrete batching plant. The maintenance history of the existing substation has demonstrated that airborne concrete dust particles from the batching plant have impacted the life cycle and reliability of substation equipment. These particles can lead to increased equipment maintenance costs and operational failures, reducing system assurance and reliability.

**Location option 2 – Sydney Trains Major Works Depot site**

The depot site is located on Railway Parade to the west of the proposal site (opposite the intersection between Railway Parade and Smith Street). This site would require excessive cable lengths to supply required power to the rail network, resulting in a requirement for larger cable sizes and additional conduiting. This would increase the amount of construction works required.

**Location option 3 – West of Bold Street Bridge**

This site is currently used as a construction laydown area for heavy plant and materials for track maintenance and construction works. There is no alternative access to the rail corridor for track maintenance vehicles and equipment. Additional infrastructure constructed in this area would
compromise access for heavy plant to an unacceptable level for operational and maintenance requirements.

**Location option 4 – The proposal site**

Option 4 is the site for the proposed substation. It was previously used as a Sydney Trains office compound and carpark.

### 4.4.2 Building finishes/appearance options

Three options were considered for the building finish. The building design, dimensions, louvre openings and panel width would be identical for all options.

**Option 1 – vertical emphasis to the main precast concrete wall panels**

Option 1 would have a vertical emphasis to the main wall panels (in terracotta colour) to frame a pair of wall louvres at first floor level. A single centre louvre at ground floor level would be set within lighter orange coloured panels to give an inverted T-pattern. The terracotta panels would have a horizontal groove pattern to contrast the narrow vertical proportion.

The louvres would be finished in a dark grey/blue colour along with other external metalwork.

The building wall facing the street would be finished in the same light coloured panels as the ground floor. The first floor level panels would have a much wider horizontal groove than the other three wall panels.

The walls between the transformers and around the perimeter of the transformer yard would be finished in similar grooved terracotta and smooth light coloured precast concrete panels, but with a wider more random spacing than the building facade.

**Option 2 – smooth faced precast concrete wall panels**

Option 2 would use smooth faced precast concrete panels for the ground and first floor levels so as not to create any pattern effect between the wall and louvre panels. The first floor level would be used to visually separate the two levels, with light beige colour used in the first floor wall panels, and a contrasting grey/green colour used in the ground floor panels. The walls to the ground floor area would use a wider panel and different panel set out than the first floor. This would create a visual break and contrast the narrow vertical appearance of the first floor walls. The louvres and other metal work would be finished in a dark olive green contrasting colour.

The walls between the transformers and around the perimeter of the transformer yard would be finished in a similar pattern of light and dark coloured panels, but in a wider more random spacing than the building facade.

**Option 3 – precast concrete wall panels with a brick pattern facing**

Option 3 would use precast concrete wall panels with a brick facing tile in the same panel set out as option 2. The precast panels would use an unglazed tile to match the colour of the bricks at the existing Signals Box, located to the north of the site for the proposed substation. A darker brown coloured unglazed tile would be used as a plinth at the ground floor level and as a soldier course string line across the heads of the ground and first floor louvres. This would reflect the recessed string lines above and below the windows at the Signals Box. The uniform brick wall colour and the strong horizontal string lines would reduce the potential visual impacts of the vertical precast wall panels.

The precast concrete walls between the transformers would be constructed using standard grey concrete colour precast panels. The walls around the perimeter of the transformer yard compound would be finished in a combination of the orange coloured tiles and smooth standard
grey concrete panels in a regular pattern. This would contrast with the darker brick used as a plinth and as a soldier course string line.

4.4.3 Permanent site access options

Option 1 – Access the site through an adjoining site owned by Transport for NSW

This option would involve establishing an access to the site via one of the adjoining sites to the east or west, and using one of the existing driveways to these sites. Provision of this access would result in:

- the need to address site security and all hours access arrangements of both the adjoining site (in accordance with the occupier’s operational requirements) and the site for the proposed substation (that is, the requirements of the Office of National Rail Safety Regulator (ONRSR), the Electricity Supply (Safety and Network Management) Regulation 2002, and Sydney Trains Operational requirements)
- potential for loss of on-site parking spaces from the site through which access is gained associated with the provision of an internal driveway to the site for the proposed substation, with the resultant potential increase in the use of on-street parking spaces by employees
- potential for unsafe site arrangements and vehicle circulation within the site through which access is gained.

Option 2 – Access the site through a new access and driveway directly from Railway Parade

This option would involve establishing a new direct access to the site from Railway Parade. The new access would need to be located at the eastern end of the site, and would require a new concrete driveway and kerb crossover. Provision of this access would result in:

- permanent loss of two on-street parking spaces for the new driveway, assuming that an eight metre wide driveway would be required (based on the requirements of Roads and Maritime Services’ Guide to Traffic Generating Developments (RTA, 2002)).
- any semi-trailer movements via this driveway would need to be under authorised traffic control as per Roads and Maritime Service’s, Traffic Control at Work Sites manual (RTA, 2010)
- removal of three planted trees from a formed garden bed in the road verge.

4.4.4 Temporary construction site access options

Option 1 – Provide a single construction access to the site

This option would involve using the proposed new access at the eastern end of the site (option 2 above) during both construction and operation. The potential implications of this option are as noted in section 4.4.3. In addition, to control parking and allow safe entry to the site, a temporary ‘no stopping zone’ would need to be established on either side of the driveway, in accordance with the requirements of Parramatta City Council. The length of the no stopping zone would need to be confirmed by the construction contractor based on local sight distances and heavy vehicle moving paths. The temporary no stopping zone would result in the temporary loss of on-street parking spaces from the northern side of Railway Parade. The actual number of parking spaces lost would depend on the length of the zone, with an estimated loss of around two spaces assumed for the purpose of the REF.
Option 2 – Provide two construction accesses to the site

This option would involve using the proposed new access at the eastern end of the site for both construction and operation. It would also involve providing an additional temporary access to the western end of the site off Railway Parade, for at least some of the construction period. Provision of two accesses to the site would result in:

- temporary loss of up to an additional two on-street parking spaces (from a western temporary construction access) in addition to the two lost for the eastern access, assuming that an eight metre wide driveway would be required (based on the requirements of Roads and Maritime Services’ Guide to Traffic Generating Developments (RTA, 2002))
- the loss of parking associated with the western driveway would be influenced by the fact that this temporary driveway would be located directly opposite to a T junction with The Avenue – the actual number of on-street parking spaces impacted would depend on the sight lines and the proposed width of the driveway, and would need to be confirmed during detailed design
- implementation of a temporary no stopping zone to control parking on either side of the driveways and associated loss of parking
- provision of an additional temporary road access in close proximity to the existing access to the adjoining site (to the west of the site)
- potential for removal of additional vegetation (one tree would need to be removed) and the need to protect the fig tree located in the road verge outside the western end of the site.

4.5 Preferred options

4.5.1 Location

Location option 4 was chosen as the preferred location for the proposal as it would:

- enable development of a substation with a rectangular footprint typical of usual traction substations
- allow direct access from the road network
- allow the existing substation to remain in service whilst construction works are undertaken
- provide sufficient cable routing and jointing options.

4.5.2 Building appearance/finishes

Option 3 was chosen as the preferred appearances/finishes option for the following reasons:

- the brick façade provides the opportunity to visually link the new substation to the brick Signals Box
- there are no other precast concrete wall buildings in the vicinity of the site
- the brick material is more consistent with the brick and weatherboard houses located along Railway Parade.
- it better reflects some of the architectural detailing of the Signals Box
- it provides different width wall panels at ground and first floor levels rather than the same narrow width panels at both levels
• the two end walls could be squared off as a parapet to reflect the parapet at the Signals Box.

4.5.3 Permanent operation access to the site

Access option 2 (a new access and driveway directly from Railway Parade) is the preferred option for the following reasons:

• The site for the proposed substation is a standalone site which requires high levels of security, including secure site access. This is better controlled by the site having its own access from the road network rather than via an adjoining site used for other purposes.

• The access to the site must always be kept free of any obstructions which could eventuate if the site was accessed from an adjoining site. Due to the importance of proposed substation (a junction substation) to the operation of the rail network, emergency and maintenance services must have unimpeded access at all times.

• Some equipment is large and very heavy, requiring delivery by a low loader articulated vehicle. The site layout has been designed to enable delivery vehicles to enter the site directly from the street. Entering the site through adjoining sites would involve difficult, if not impossible, turning movements/requirements.

4.5.4 Temporary construction access

Access option 1 (single construction access to the site) is the option that has been assessed by this REF. This option would minimise the number of site accesses required; the loss of additional vegetation; and impacts on on-street parking compared to option 2. However, this option would require semi-trailer movements to/from the site to be under authorised traffic control as per Roads and Maritime Service’s, Traffic Control at Work Sites manual (RTA, 2010).
5. **Description of the proposal**

This section provides a description of the proposal, based on the design work undertaken to date. This includes an overview of the key components and design features of the substation, and a description of how it would be constructed and operated.

5.1 **The proposed substation**

5.1.1 **Substation building and equipment**

The proposal would comprise a substation building with external, bundled high voltage (HV) enclosures at ground level to house the electrical equipment and associated facilities.

The maximum external height of the building would vary between about five to eight metres above the footpath level. The total size of the substation building would be about 29 metres long by 12 metres wide. The substation building would have a ground floor area of about 380 square metres.

The cable chamber would be used to reticulate cables within the substation, with in-ground cable pits and buried conduits used to house cables connecting the substation to the existing rail network.

The building would have an internal clear height at ground floor level of 2.75 metres to the underside of the floor structure. The height of the internal switchroom would vary between 3.5 and 4.2 metres across the width of the building. Electrical equipment at switch room level would be accessed by a roller shutter door at the first floor level dock, and at ground floor level via a combined main access and service door on the southern side of the building below the dock.

An external yard on the southern side of the substation building would accommodate a power transformer, two rectifier transformers and a reactor. These transformers would be located in individual bundled enclosures separated by 4.2 metres fire walls. The overall size of the external transformer and reactor yard would be six by 25 metres.

The southernmost side of the substation site would consist of two harmonic filter compounds with size of about seven by 30 metres.

The external yards would be enclosed with precast walls that would be 4.2 metres in height.

The substation would contain the following facilities and equipment:

- one 5/6.25 MW 33/11 kV transformer
- two 5.35 MW 33 kV/600 V rectifier transformers
- two 5 MW 1500 V DC rectifiers
- one 0.5 mH 4000 amp reactor
- three 33 kV AC switchboards
- two 11 kV AC switchboards
- one 11 kV harmonic filter and one 33 kV harmonic filter
- 1500 V DC circuit breakers
- battery cabinet and charger
- distribution boards
- changeover panel
- administration office
• staff toilet
• other ancillary equipment.

The external bunded yards containing the transformers and reactor would be connected to a common oil-water separator system, via flame trap pits within each bund. The yards would be designed to ensure that any oil spills are contained on-site within the bund and/or the oil separator pit.

The bunded yards would incorporate parallel footing beam plinths extending to the southern wall, and fibreglass reinforced plastic grating installed flush with the top of the bund to provide an all-weather maintenance platform.

Figure 5.1 and Figure 5.2 show the key features of the proposal.

5.1.2 Building design and form

The ground floor cable chamber would be constructed on a concrete slab supported on bored piers. External cabling would connect to the proposed substation through underground conduits. A concrete framed structure would be constructed off the ground floor slab to support the first floor slab.

The walls of the cable chamber and switch room would consist of precast concrete panels. The panels would incorporate a profiled texture finish from first floor level and smooth finish to the ground floor panels, which would be treated with a clear anti-graffiti coating. The first floor would comprise a steel framed column and beam structure to support the wall panels and the roof. The steelwork would be exposed internally within the switch room, with the possible exception of a suspended plasterboard ceiling over the DCCB cubicles if a lower ceiling height is required. The roof would be finished with steel purlins and foil backed insulation beneath a metal deck roof.

External bunded areas would be set into the ground and include precast concrete separation walls between adjoining transformer bays as well as the perimeter of the external equipment compound. A security mesh sliding gate would be used to secure the area. The bund yards would be separated from the switch room building by two hour fire rated precast concrete wall.

The harmonic equipment bays on the street side would be set back three metres from the boundary line. Apart from the air conditioned office space, the substation will be naturally ventilated, with low level storm proof intake louvres on the eastern and western side and high level relief louvres on the southern side.

The building facade facing the street will have no wall openings. Since the street side of the substation will also house the outdoor transformer equipment, the perimeter walls of the transformer yard will also be precast concrete to 4.5 m high set behind a three metre high security fence and gates. Precast concrete wall panels with a brick pattern facing would be used.

The design of the proposed substation would continue to be refined during future design phases. The final design of the substation would integrate all relevant considerations, including:
• urban design and visual assessment
• environment and sustainability
• functional and operational needs and requirements
• access and maintenance
• security.
Figure 5.1 The proposal
Connections with the rail corridor shown in Appendix B.

- New section of overhead 33 kV power line
- Section of 33 kV power line to be removed
- The proposal site
- Building
- Hardstand
- Driveway
- Railways
- Railway corridor

Figure 5.2 The proposal – electrical connections
5.1.3 Security fencing and lighting

A new three metre high security fence would be provided around the site boundary on all four sides of the site. The street entrance would be secured by three metre high vehicle gates to match the security fencing, and would include a separate personnel gate. The fence and gates would be finished in low gloss black powdercoat. Photo 5.1 shows similar fencing used for another substation.

The substation building would have wall mounted security lighting above each door opening for night-time illumination. The external transformer yards would have manually switched lights (integrated with staff access system) for night maintenance.

![Photo 5.1 Example of fencing](image)

5.1.4 Operational access and car parking

The security requirements for traction substations mean that a new secure vehicular access to the site for the proposed substation would be required off Railway Parade. The access would need to be of sufficient width to allow access by a semitrailer and crane. It would not be possible to access the site from adjoining sites. Vehicular access to the substation site would be via a new six metre wide concrete driveway off Railway Parade (as shown in Figure 5.1). The new driveway and kerb access would be designed in accordance with the requirements of the ASA standard for access roads (Transport for NSW, 2014), and in consultation with Parramatta City Council.

The site would also provide parking for up to three utility sized service vehicles.

5.1.5 Chemical storage

It is likely that the following approximate quantities of oil would be used within the oil-cooled transformers on-site, which would be located within appropriately secure and bunded areas attached to the substation building:

- 5,200 litres of oil in the 33/11 kV transformer
- 3,200 litres of oil in the reactor
- 5,500 litres of oil in the rectifier transformers.
The bunded areas would be designed and constructed in accordance with relevant Australian Standards. Each transformer would be positioned within its own bunded yard, which would be connected via complying sump and flame-trap arrangements to the common oil-water separator located at the eastern side of the substation. In accordance with the EPA’s guidelines, *Bundking and Spill Management* (EPA, 2015) the overall collection system would, as a minimum be capable of storing/processing at least 100 per cent of the total capacity of the largest vessel within the system, with an additional allowance for rainwater (if the bund area is uncovered) allowing for sufficient capacity to cope with a one-in-twenty year 24 hour storm.

The oil-water separator would collect all run off from the outdoor yards. The oil and water separator would separate the oil from the water. The water would be discharged to the stormwater while the oil would be removed from site for disposal at an appropriately licensed facility.

### 5.1.6 Connection to existing overhead wiring system and services

#### Connection to existing feeders

Feeders originating from the existing substation would be diverted to the proposed substation by means of underground cable jointing within the rail corridor.

#### Connection to overhead wiring system

Connection to the existing 33 kV overhead wiring system would also be required. This would involve changes to two 33 kV overhead feeders (refer to Figure 5.2).

Feeder 718 is an overhead line which runs to the western end of Cowper Street. At the end of Cowper Street the line then goes underground at pole number 101. The proposal would involve removing the line from pole 99, located at the corner of Cowper Street and Bold Street. A new overhead line would be constructed from pole 99 across Bold Street to a new pole to be located within the rail corridor in the vicinity of the existing signals hut.

Feeder 722 is an overhead line which runs along Bridge Street and west over Bold Street to the rail corridor. At pole 145T, towards the western end of Bridge Street, the line would be relocated underground and then continue west in the rail corridor in an above-ground steel trough.

### 5.1.7 Service connections and relocation

#### Service connections

The proposal would involve new connections to Sydney Water’s wastewater and potable water networks. A wastewater service runs parallel to Railway Parade along the southern side of the road, about 15 metres south of the proposal site. An existing potable water service is located to the immediate south of the proposed access gate, about 12 metres south of the proposal site.

The proposal would involve constructing underground pipeline connections to these existing services. Both pipelines would be about 100 millimetres in diameter and constructed of polyvinyl chloride (PVC). The proposed alignments of the pipelines are shown in Figure 5.1.

The proposal would also involve diversion of an existing stormwater pipeline located across the site for the proposed substation. A new stormwater pipeline would be constructed within the site, to the east of the substation footprint.

#### Service relocations

In the event that assessments during detailed design identify the need for any relocations, they would be undertaken by an accredited contractor in consultation with the utility provider.
Existing communication and signalling cabling connected to the existing substation would be diverted to the proposed substation. This existing cabling is within the rail corridor. The relocated service routes would be confirmed during the detailed design phase in consultation with Sydney Trains.

**5.2 Decommissioning of the existing Granville Substation**

Following commissioning of the new Granville Junction Substation the existing Granville Substation would be decommissioned. This would involve:

- removal of all redundant electrical equipment both within and external to the substation building
- removal of high voltage cables and cable trays
- other services (including the light and power conduits) would be capped off and retained
- remediation (if required) of any disturbed areas where hazardous materials are potentially present inside or outside the substation building
- any essential repairs and modifications to prevent deterioration and to secure the site and the building from vandalism.

Removal of the existing Granville Substation building would involve:

- removal of building and all structures to slab level
- classification and disposal of waste materials as described in section 7.10
- remediation (if required) of any disturbed areas where hazardous materials are potentially present inside or outside the substation building
- any essential repairs to prevent deterioration and to secure the site.

**5.3 Construction information**

**5.3.1 Indicative construction activities**

Construction would involve the following indicative works:

- order off-site prefabricated items as required
- site establishment
  - services protection works
  - establishing the construction compound (refer section 5.3.4)
  - installing safety fencing around the construction site
  - installing erosion control measures
  - establishing site access
  - vegetation removal and/or trimming, as required
- enabling works including installing conduits (in trenches) to rail corridor for connections from the substation to the existing feeders
- site excavation and benching
- trenching of water and wastewater mains from the site to the connection points - trenches would be about 600 mm wide, with the depths varying depending on local ground conditions or other site requirements
- piling works and site excavation for in-ground services (make use of existing for new connections as applicable):
- use of piling rigs to construct the piles for the ground slab
- excavate building and bund yard areas for construction of in-ground pits and conduits
- excavate for oil/water separator tank and related services
- excavate for toilet hydraulic services.

- construct cable ground floor cable chamber slab followed by loadbearing precast wall panels and internal columns in concrete blockwork
- substation construction – involves construction of the suspended first floor slab with openings for equipment cables, erection of wall/roof steelwork and purlins, delivery and installation of precast wall panels, installation of the metal deck roof sheeting. This would be followed by the wall ventilation louvres, doors and internal finishes and fitout.
- electrical works and fit out, including connection to the electrical network - connection to the overhead wiring structures would require some trenching activities, the size and location of trenches would be confirmed during detailed design
- paving works and driveway construction followed by installation of security fencing and gates
- equipment commissioning in new substation
- decommissioning of equipment in existing substation and removal of material from site
- removal of the existing substation and associated waste materials from site
- restoration of disturbed areas and landscaping as required
- site clean-up.

Excavation across the site would generate about 650 cubic metres of spoil, all of which would need to be removed from the site.

### 5.3.2 Construction workforce

Construction of the proposal would involve a maximum workforce of up to about 30 people on the site for the proposed substation at any one time.

Decommissioning/removal of the existing substation would involve a workforce of about five people for the period of works (about a week).

### 5.3.3 Equipment

Plant and equipment used to construct the proposal may include (but not be limited to):

- water cart
- concrete saws
- backhoes
- hand tools
- jack hammers
- light commercial and passenger vehicles
- mobile crane
- tip trucks
- concrete agitator trucks
- concrete pumps
- air compressor
- generators
- road sweepers
- large delivery trucks
- low loader
- piling rig.
5.3.4 Construction compound/s, access and vehicle movements

Construction compound

The construction compound would be located within the existing Lidcombe to Granville Corridor Upgrade Project site to the west of proposal site, shown in Figure 5.1.

Fencing

The construction site and compound would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions.

Construction access and parking

The proposed new site access off Railway Parade (refer to section 5.1.4) would be provided prior to construction commencing. Site access would be controlled by a locked gate.

During the daily pre-work briefs, construction workers would be encouraged to travel to the compound and proposal site via public transport, and not park in surrounding roads.

Parking for about 17 work vehicles would be provided within the construction compound.

Construction traffic and access would be managed in accordance with a traffic and access management sub-plan, to be prepared by the construction contractor as part of the construction environmental management plan (CEMP) for the proposal (refer to 7.5.4).

Vehicle movements

It is estimated that construction vehicle movements to the site for the proposed substation would involve a daily maximum of about 28 heavy vehicle movements and up to about 30 light vehicle movements. A breakdown of the traffic movements is provided in Table 5.1.

Table 5.1 Estimate of construction vehicle movements

<table>
<thead>
<tr>
<th>Vehicle type</th>
<th>Activity</th>
<th>Daily vehicle numbers</th>
<th>Movements per day</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction of the proposed substation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy vehicles</td>
<td>Concrete pours</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Delivery of precast components</td>
<td>4-6</td>
<td>8-12</td>
</tr>
<tr>
<td>Light vehicles</td>
<td>Construction personnel vehicles – assuming that about half of the staff would travel to site using public transport</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td><strong>Decommissioning/removal of the existing substation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy vehicles</td>
<td>Transport of waste materials from the site</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Light vehicles</td>
<td>Construction personnel vehicles – assuming that about half of the staff would travel to site using public transport</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>
It is anticipated that the majority of traffic movements associated with the proposal would be undertaken during standard construction hours (refer to section 5.3.5 below). However, there may be a need for limited vehicle movements outside of standard construction hours for the delivery of:

- material/equipment for railway possessions during allocated times
- oversized equipment (such as transformers) required to be transported during hours/times as specified by RMS/NSW Police.

These deliveries would be in accordance with the requirements of relevant authorities. Further information on is provided in section 7.5.

### 5.3.5 Construction timing, staging and work hours

#### Construction timing

Construction of the proposed substation is scheduled to commence in mid to late 2016 and continue for about 12 months. Civil works would be undertaken over the first nine months, with electrical and services fit-out undertaken over the following three months. Commissioning would then take about six months.

Decommissioning/removal of the existing substation would be undertaken following commissioning of the proposed substation. This would take about one to two weeks.

#### Work hours

Construction would occur during the standard hours set out in the *Interim Construction Noise Guideline* (DECC, 2009):

- Mondays to Fridays between 7 am and 6 pm
- Saturdays between 8 am and 1 pm

Out of hours works (including work on Sundays) would be limited mainly to scheduled rail closure times (known as ‘track possessions’, which are times that a rail line is shut down to allow for planned maintenance, construction works etc). However, some out of hours works would be required outside of these periods. Works that may need to be undertaken during these periods include (but are not limited to) the connection to the overhead wiring system, installation of certain electrical equipment, installation of underline crossings and delivery and/or removal of oversized equipment.

If out of hours work is required, the contractor would obtain approval from Transport for NSW as outlined in section 7.3.5. All of out of hours work would be undertaken in accordance with the *Construction Noise Strategy* (Transport for NSW, 2012).

#### Works during track possession periods

The proposal involves some works during track possession periods, including connection works and the decommissioning of the existing Granville Substation. A number of predetermined possession periods would be available. In the event that additional special possessions are required, these would be arranged in consultation with Sydney Trains. Controlled power outages, which may need to occur out of hours, would also be required during construction.
5.4 Operation of the proposal

The main function of the substation would be to convert the incoming 33 kV power supply to 1500 V which can be used by rolling stock on the Sydney Trains network. The substation would operate 24 hours a day to ensure that power supply is provided to the network at all times.

Generally, no permanent staff members would be located on-site. However, maintenance requirements and equipment service intervals may result in extended periods of staff being on site.

Maintenance activities would involve infrequent site visits. These visits would generally consist of one utility vehicle accessing the site. In emergency situations additional vehicles may need to access the site.

Oversized vehicles may occasionally need to access the site to maintain and/or replace the transformers. If this is required, these vehicles would enter the site from Railway Parade via the new access gate.

5.5 Sustainability

A sustainability assessment of the proposal was undertaken as part of the design process in accordance with the Transport for NSW Sustainability Design Guidelines version 3.0 (Transport for NSW, 2013). Under the guidelines, the proposal is considered to be a ‘maintenance facility’.

A number of themes were considered in the assessment including:

- energy and greenhouse
- climate resilience
- materials and waste
- biodiversity and heritage
- water
- pollution control
- community benefit.

The assessment identified discretionary and compulsory initiatives that could be incorporated into the proposal.

Compulsory initiatives may relate to a corporate target or are considered to be fundamental to the delivery of sustainable assets. If an initiative is considered applicable, then it must be completed.

A discretionary initiative may not be practical for a particular project or be the most appropriate initiative to meet a sustainability outcome. Written justification must be provided if a discretionary initiative has not been selected for implementation.

The assessment identified 16 compulsory initiatives and 69 discretionary initiatives that relate to the reference design.

The current rating of the proposal (in accordance with the guidelines and at this reference design phase) is a ‘platinum’ sustainability design rating. This means that 97 per cent of applicable discretionary points have been achieved by the design. To maintain this rating, the design would continue to be refined during the detailed design phase.

An assessment of the proposal against the guidelines will also be undertaken during the detailed design phase.
6. Community and stakeholder consultation

This section summarises the community and stakeholder consultation undertaken as an input to development of the proposal and the REF.

6.1 Consultation for the Power Supply Upgrade Program

The approach to consultation for projects being undertaken as part of the Power Supply Upgrade (PSU) Program is guided by Transport for NSW’s Community Engagement Policy (April, 2012), which notes the agency’s commitment to:

- identify and, where possible, respond to the needs of the community
- provide opportunities to encourage community feedback
- keep the community regularly informed of the progress of our projects
- provide easily accessible information
- encourage a sense of community ownership of the projects we deliver
- be transparent in all that we do
- maximise community understanding of our role and the rationale for the projects we deliver.

6.2 Consultation for the proposal

6.2.1 Consultation plan

A consultation plan for the proposal (the Granville Junction REF Community Engagement Plan) has been developed by GHD in consultation with Transport for NSW. The purpose of this plan is to describe the management and communication processes that will be employed to provide information and seek community feedback on the design and assessment of the proposal.

6.2.2 Consultation objectives

The plan states that the overall objective of consultation is to ensure that key stakeholders and the community are aware of the proposal and are given the opportunity to express their views. The plan identifies the following objectives for consultation:

- identify the impact of the proposal on internal and external stakeholder, customers, residents and the community
- provide a proactive approach to managing issues regarding communication and information flow
- reassure internal and external stakeholders that Transport for NSW is meeting its expectations regarding professional management practice in the delivery of its capital and maintenance works programs
- enhance Transport for NSW’s working relationship with its customers, residents and the community when undertaking essential capital or maintenance works.
6.2.3 Consultation and communication activities

As outlined in section 3.2.1 formal statutory consultation under the Infrastructure SEPP is not required. However, to achieve the objectives of the consultation plan, the following consultation activities will be undertaken:

- letters to stakeholders
- briefings with key stakeholders
- distribution of a community information flyer
- targeted consultation of the REF for two weeks.

The following key stakeholders have been identified:

- Parramatta and Holroyd council representatives
- residents and businesses located within the vicinity of the proposal site
- Sydney Trains
- Transport for NSW staff
- utility providers who service the site.

An initial meeting was held with representatives of Parramatta City Council on 20 July 2015. The purpose of the meeting was to provide information and obtain feedback on the proposal. Key issues raised during the meeting are summarised in Table 6.1.

### Table 6.1 Issues raised by Parramatta City Council

<table>
<thead>
<tr>
<th>Issue category</th>
<th>Issues raised</th>
<th>Where addressed in REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic, transport and access</td>
<td>Need for a new street access to the site when Sydney Trains owns the adjoining sites.</td>
<td>Section 5.1.4</td>
</tr>
<tr>
<td></td>
<td>Nature of the proposed access to the site and traffic management associated with access</td>
<td>Sections 5.1.4, 5.3.4 and 7.5</td>
</tr>
<tr>
<td></td>
<td>Impacts on the bus stop outside the site</td>
<td>Sections 4.4.3 and 7.5</td>
</tr>
<tr>
<td></td>
<td>Parking for construction workers and vehicles</td>
<td>Section 5.3.4</td>
</tr>
<tr>
<td></td>
<td>Impacts on on-street parking</td>
<td>Section 7.5</td>
</tr>
<tr>
<td></td>
<td>Impacts on the operation of the bus stop outside the site</td>
<td>Section 7.5</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Impacts on the street trees located outside the site</td>
<td>Section 7.2</td>
</tr>
<tr>
<td>Planning</td>
<td>Impacts on land between the rail corridor and Parramatta Road proposed for redevelopment as part of the Parramatta Road urban renewal strategy</td>
<td>Section 7.6</td>
</tr>
<tr>
<td>Noise</td>
<td>Noise impacts during construction and operation</td>
<td>Section 7.3</td>
</tr>
</tbody>
</table>

6.3 Targeted consultation

Targeted consultation of the REF will be carried out for a period of two weeks, during which time written submissions will be accepted. The REF will be placed on display at Granville Library.

The REF would also be available via the Transport for NSW website at: www.transport.nsw.gov.au/projects.
Surrounding landowners and occupants would be contacted at the beginning of the consultation period. This would notify residents of the consultation period and how to access the REF.

Throughout the consultation period the following contact mechanisms would be available to the community:

- Transport for NSW’s Project Infoline (1800 684 490)
- Transport for NSW’s project email address (projects@transport.nsw.gov.au)

6.4 Future consultation activities

Following targeted consultation of the REF, Transport for NSW will consider the issues in the submissions and prepare a report to:

- summarise and respond to the issues raised
- provide any new information concerning the proposal
- identify any changes to the proposal and the potential impacts of those changes.

Anyone who makes a submission (and provides their contact details) would be notified when the proposal’s determination report is available for viewing on the Transport for NSW website.

Should Transport for NSW proceed with the proposal, consultation with the community and key stakeholders would be ongoing in the lead up to, and during, construction of the proposal.

Transport for NSW’s Project Infoline and email address would continue to be available. Targeted consultation methods, such as letters, notifications, signage and verbal communications, would occur as required. Transport for NSW’s 24 hour construction information line 1800 775 465 number would also be available for any complaints or enquiries during construction.

6.4.1 Management of complaints


- Details of all complaints received will be recorded.
- A verbal response describing what action will be taken will be provided to the complainant within two hours (unless the complainant agrees otherwise).
- A detailed written response will be provided to the complainant within seven calendar days.
7. Environmental impact assessment

This section summarises the environmental impact assessment undertaken for the proposal and includes summaries of the specialist studies undertaken.

7.1 Soils and water quality

7.1.1 Existing environment

Topography, geology and soils

The site is relatively flat and is located at an elevation of about 10 metres Australian height datum (AHD). The Soil Conservation Service of NSW 1:100,000 Soil Landscape Series Sheet 9130, Sydney, indicates that the site is classified as Blacktown soil landscape. Soils are shallow to moderately deep (less than 100 centimetres) hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes, and in drainage lines. The Geoscience Australia 1:100,000 Geological Series Sheet 9130, Sydney classifies the site as Ashfield Shale and is described as follows: Black to dark-grey shale and laminate, Triassic age.

Parsons Brinckerhoff (PB) completed soil sampling and analysis in October 2006 (PB, 2006) at nine test pit locations across an area which included the eastern half of the site for the proposed substation. The results indicated that the area of the site that was sampled was found to be covered in ballast fill up to 0.5 metres depth. This consisted of brick fragments, small boulders and ash. The underlying geology was found to consist of clay/gravelly clay.

Contamination issues

A search of the EPA’s Contaminated Land Record was undertaken on 30 June 2015 for the study area surrounding the proposal site. No contaminated sites were identified in the immediate vicinity of the proposal site. The nearest recorded contaminated site is on Parramatta Road, about 120 metres to the east of the site for the proposed substation.

No odours or staining were noted in PB’s soil samples. Surface samples contained a concentration of total petroleum hydrocarbons (TPH) C_{10}-C_{36} slightly exceeding the adopted site investigation criteria. Three near surface samples contained concentrations of benzo(a)pyrene which exceeded the criteria. The ash in the fill material was noted as being the likely source of the benzo(a)pyrene exceedances.

A geotechnical and contamination site investigation was completed by GHD in July and August 2015. Borehole drilling for the site investigation was carried out between 27 and 29 July 2015. Fill materials were encountered in all boreholes, which were typically described as gravelly clay. The fill was identified as ballast, road base or ash, mixed with clay and sand, likely to be associated with previous site uses for rail purposes. The depth of fill materials ranged from 0.5 to 1.5 metres below the ground surface.

The findings of the contamination investigation can be summarised as follows:

- Only one sample, taken from within the rail corridor, had evidence of hydrocarbon contamination. The analytical results of this sample did not indicate any exceedance of the adopted site investigation levels.
- No exceedances of heavy metals screening criteria were identified.
• Three material fragments (FRAG_01, FRAG_02 and FRAG_03) collected from building rubble on the ground surface tested positive for the presence of asbestos including chrysotile and amosite forms of asbestos.

• Surface soils collected from a depth of zero to 0.1 metres at sampling location GHD05 (including duplicate sample collected from the same location) tested positive for the presence of chrysotile asbestos in loose fibre bundle form. No respirable fibres were reported. However, given the potential for fibre release, appropriate health and safety precautions would be implemented during construction.

• Given the presence of asbestos in surface soils at sampling location GHD05, material to be excavated and disposed off-site from the vicinity of this location would be classified as ‘special waste asbestos’, and disposed of at an appropriate facility suitably licenced to accept such waste. Material from the vicinity of GHD05 would be excavated and stockpiled separately to avoid mixing of potentially different waste streams. The waste classification would be confirmed prior to disposal.

• For the purpose of preliminary in-situ waste classification, the laboratory analytical data collected indicates that, with the exception of soils in the vicinity of sampling location GHD05, it is likely that excavated soil materials would be classified as General Solid Waste. Waste classification of excavated material would be confirmed prior to disposal.

Further information on waste and hazardous materials (including asbestos) is provided in section 7.10.

**Drainage and watercourses**

The nearest waterway to the site for the proposed substation is A’Becketts Creek, which is located about 280 metres north of the site. A’Becketts Creek drains to Duck Creek about 1.2 kilometres to the east of the site, and then Duck River about two kilometres to the east. Surface water drains to Council’s stormwater network.

**Groundwater**

A search of the NSW Water Information Database indicated that the nearest groundwater bore is located about 115 metres to the east of the site for the proposed substation.

GHD’s geotechnical and contamination investigation for the proposal included the installation of a groundwater well. On 5 August 2015 the groundwater level was observed to be 3.1 metres below ground level.

A water quality sample was taken from one borehole during the investigation. The analytical results indicated that concentrations of cadmium, nickel and zinc exceeded the adopted guidelines for protection of freshwater aquatic ecosystems. Concentrations of copper also exceeded the adopted guidelines. These elevated heavy metals are likely to be representative of background conditions in the area.

No exceedance of adopted health screening levels were noted. The majority of organic analytes were less than the laboratory practicable quantification limits (PQL), with the exception of total recoverable hydrocarbon (TRH) C6-C10. It is noted that the laboratory PQLs for naphthalene, several organochlorine pesticides (OCPs), and polychlorinated biphenyls (PCBs) were higher than the adopted guidelines for protection freshwater aquatic ecosystems. As no soil sample results exceeding the adopted guidelines were reported for these chemicals, the site for the proposed substation is not considered to be the source of this contamination.
Water quality

Surface water quality sampling from A’Becketts Creek was undertaken in March 2014 as part of the WestConnex M4 widening project. The physical parameters tested indicated aerobic water conditions (with dissolved oxygen concentrations ranging from 1.24 to 8.27 mg/L) within a freshwater environment containing varying pH levels from neutral to slightly alkaline (pH range of 6.77 to 9.1) (SMEC, 2014).

Visual observations made during the water quality sampling concluded that there were no obvious visual or olfactory evidence of potential contamination (SMEC, 2014).

Given the highly developed nature of the surrounding environment (including industrial, road, rail and residential land uses) it is likely that the quality of surface water runoff in the vicinity of the proposal site would be impacted/influenced by the existing land uses, particularly during periods of high rainfall.

7.1.2 Impact assessment

Construction

Construction of the proposal would involve disturbance to the ground surface to construct the slab, access driveway, undertrack crossings and underground services at the existing substation site. Small stockpiles of excavated soil would be created during construction.

Trenchless underboring of the undertrack services crossings would require the formation of enlarged temporary excavations positioned at the extents of the undertrack crossings to accommodate boring plant and equipment, casing and pipe lengths, excavated spoil removal and sump pumping equipment.

In accordance with the NSW Sustainable Design Guidelines (Transport for NSW, 2013), opportunities would be investigated to reuse 90 per cent of excavated, non-contaminated, spoil. The spoil would be reused on-site where possible to either backfill excavations or during site levelling works. Excess spoil (up to about 1,200 cubic metres) not suitable for backfilling would be stockpiled in a suitable location prior to being tested, classified, and disposed of at an appropriately licensed facility.

Soil disturbance

Excavation, demolition and stockpiling activities, if not adequately managed, could have the following impacts:

- erosion of exposed soil and stockpiled materials
- dust generation from excavation and vehicle movements over exposed soil
- an increase in sediment loads entering the stormwater system and/or local runoff.

These impacts are considered to be minimal, as exposure of soil and the stockpiling of spoil would be temporary and short-term in duration.

Contaminated soils

The proposal has the potential to result in soil and water contamination via any accidental fuel or chemical spills from plant and equipment. The installation and commissioning of electrical equipment (for example, the transformers) would involve injecting oils and other chemicals onsite. The potential for impacts as a result of any spills or leaks would be managed by the implementation of measures provided in section 7.1.3.

Given the preliminary waste classification data (i.e. special waste asbestos), contaminated materials may be encountered during construction. To ensure the safety of the community and construction personnel, appropriate measures would be implemented to manage, remediate
and dispose of contaminated materials. Measures to manage contaminated materials are provided in section 7.1.3. Measures to manage waste and hazardous materials are provided in section 7.10.3.

**Groundwater**

The proposed footings for the substation would consist of either pile footings on bedrock (to a depth of about five metres below ground level) or a stiffened raft slab (embedded within the top 1.5 metres of fill material). Either way, there is the potential for ground excavation to intercept groundwater. Contamination of groundwater may also occur through the seepage from material and waste stockpiles, or spills of fuels, oils or other chemicals.

Any impacts to groundwater during construction would be temporary and are unlikely to be significant as a result of the small scale of the works. Mitigation measures would be implemented to minimise groundwater inflow into excavations. Excavations would be backfilled progressively to limit groundwater inflow.

Provided the mitigation measures in section 7.1.3 are implemented, impacts to groundwater are not considered to be significant.

**Operation**

The proposal would not result in any impacts to soils or water quality. As noted in section 5.1.5, bunding designed in accordance with the applicable standards would be incorporated into the proposal to contain any chemical spills or leaks. The bunded area would contain an oil/water separator to allow the oil to be removed. Water would be discharged to the stormwater network and oil from the pit would be pumped out for offsite disposal at a suitably licensed facility.

The proposal does not increase the area of hardstand at the site for the proposed substation and therefore will not impact the volume of surface water runoff entering the stormwater drainage system.

7.1.3 **Mitigation measures**

**Construction**

The measures provided below would be implemented during construction:

**General erosion and water management**

- A soils and water quality sub-plan would be prepared as part of the CEMP. It would include the following measures:
  - Spoil and groundwater management and disposal requirements based on the findings of the geotechnical and contamination investigation report (GHD, 2015).
  - An erosion and sedimentation control plan (the E&S Control Plan), which would be maintained and updated as required to ensure it is representative of the actual site works at any one time.
  - Sediment and erosion control devices (as per the E&S Control Plan) would be installed to minimise transport of sediment and materials in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). These devices would be inspected regularly and immediately after rainfall to ensure effectiveness over the duration of works. Any damage to erosion and sediment controls would be rectified immediately.
  - Control measures would be documented in the E&S Control Plan for the management and control of sediment tracking onto the local road network.
– Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and any subsequent records retained. Sediment would be cleared from behind barriers/sand bags on a regular basis as required and all controls would be managed to ensure they work effectively at all times.
– Any soils excavated that are to be used as backfill would be appropriately stored until required.
– Disturbed areas would be restored at the completion of works.
– Spill kits would be maintained on-site at all times.
– Machinery would be checked daily to ensure that no oil, fuel or other liquids are leaking as part of site pre starts.
– All water discharges would be undertaken in accordance with Transport for NSW’s Water Discharge and Re-use Guideline (2012).
– The existing drainage systems would remain operational during construction.
– Clean water would be diverted around the worksite in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).
– If dewatering is required during construction, the water would be tested (and treated if necessary) prior to re-use, discharge or disposal in accordance with Transport for NSW’s Water Discharge and Re-use Guideline (2012).

Management of contaminated soils

• A Detailed Site Investigation would be undertaken to confirm the nature and extent of contamination within the site for the proposed substation; specific requirements for further investigation and remediation; and/or management requirements of any contamination. Recommendations from the Detailed Site Investigation would be incorporated into a Remediation Action Plan (RAP) if required, to be implemented during construction.
• The Detailed Site Investigation and RAP (if required) would be in accordance with applicable guidelines, including but not limited to:
  – National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPM) 2013
  – Guidelines for Consultants Reporting on Contaminated Sites (DECCW, 2011)
  – AS4482 Guide to investigation and sampling of site with potentially contaminated soil (2005)
• If required, the RAP would identify measures to be implemented to ensure that the contamination is appropriately managed in accordance with relevant legislation and guidelines listed above.
• Where required, any materials classified as Hazardous Waste would be treated, or an immobilisation approval obtained, in accordance with Part 10 of the Protection of the Environment Operations (Waste) Regulation 2014 prior to off-site disposal.
• An ‘unexpected finds protocol’ would be prepared and included in the CEMP to assist with the identification, assessment, management, health and safety implications, remediation and/or disposal (at an appropriately licenced facility) of any potentially contaminated soil and/or water.
In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area would cease until an appropriately qualified person can advise on the need for further investigation, remediation or other action.

Additional measures for the management of hazardous materials (including asbestos) are provided in section 7.10.3.

**Operation**

No mitigation measures are required.

### 7.2 Flora and fauna

This section summarises the results of the flora, fauna and arborist assessment undertaken by GHD in July 2015. A copy of the full assessment results are provided in Appendix C. The assessment relates to the site for the proposed substation.

#### 7.2.1 Assessment approach and methodology

A desktop assessment, involving review of aerial photographs of the site, regional vegetation mapping (NSW NPWS, 2002) and threatened species databases, was undertaken to assess the likelihood of occurrence of threatened, populations or ecological communities (or their habitats) listed under the TSC or EPBC Acts at, or within, the vicinity of the proposal site.

A site inspection was undertaken on 7 July 2015. The inspection involved:

- identification and description of trees by conducting a ground based visual tree assessment
- inspection for tree-hollows, nests or scratches, scats or tracks or for other evidence of fauna activity
- searches for threatened flora species listed under the TSC and EPBC Acts previously recorded in the locality (within a 10 kilometre radius of the site)

Tree protection zones and tree structural root zones were calculated using relevant tree assessment standards, as listed in Appendix C.

#### 7.2.2 Existing environment

**Flora**

Vegetation at the proposal site is shown in Photo 7.1 and 7.2 and on Figure 7.1. The vegetation consists of trees and shrubs which have (mostly) been planted within a formed garden bed along the southern fence of the proposal site (located partly on the site and partly in the road verge adjacent to Railway Parade. There are an additional two trees located near the north-western corner of the proposal site that have also been considered as part of this assessment.

The following species recorded at the proposal site are indigenous to the Parramatta LGA (see James, McDougall and Benson, 1999): Swamp Oak (*Casuarina glauca*), Blackwood (*Acacia melanoxylon*), Port Jackson Fig (*Ficus rubiginosa*), White Cedar (*Melia azedarach*) and Spiny-head Mat-rush (*Lomandra longifolia*). White Cedar is included in the list of exempt tree species under Parramatta Council’s tree protection order (Parramatta City Council 1996), meaning that specimens of White Cedar may be removed without Council approval. Non-indigenous native species include Brush Box (*Lophostemon confertus*) and Lemon-scented Gum (*Corymbia citriodora*).
All of the trees recorded during the field inspection are planted or have self-recruited, and all are mostly in good condition. The trees range in height from six to 16 metres. Details for each tree are provided in Appendix C and the locations are shown in Figure 7.1. There are no endangered ecological communities (EECs) or native vegetation communities within or in the vicinity of the site (NSW NPWS, 2002). No threatened plant species were recorded within the proposal site during the site survey.
Figure 7.1 Location of surveyed trees
Weeds
Two environmental weeds, Camphor Laurel (*Cinnamomum camphora*) and Moth Vine (*Araujia sericifera*) were recorded. One noxious weed species, Green Cestrum (*Cestrum parqui*) was recorded, adjacent to the Camphor Laurel (tree 15).

Fauna and fauna habitats
The vegetation adjoining the proposal site does not provide habitat of importance for any native fauna species. The trees adjacent to the proposal site would provide only limited habitat value (foraging and roosting resources) for common, generalist bird species typical of highly modified urban landscapes. No nests or scratches (indicating the presence of arboreal mammals) were observed. No hollows were recorded at the proposal site that would provide potential roost sites for hollow-dependent fauna, such as possums or microchiropteran bats.

Tree 13, an early mature Port Jackson Fig located in the road verge at the south-western end of the site, may be occasionally visited by frugivorous birds as well as Grey-headed Flying-foxes (*Pteropus poliocephalus*) during fruiting (February to July). This single specimen is not considered an important habitat feature for this highly mobile threatened fauna species.

The proposal site and its immediate surrounds does not provide habitat for any other threatened species or migratory birds, taking into account the lack of native vegetation, habitat features or connectivity with areas of known habitat.

Trees 13 and 17 (a mature White Cedar growing in the north-western corner of the proposal site) are considered to provide the best habitat resources at the site.

7.2.3 Impact assessment

Tree removal
The proposed driveway construction would require the removal of three planted trees from the formed garden bed along the southern fence line of the proposal site (trees 5, 6 and 7). It is understood that trees 5 and 7 are located on the southern side of the site boundary fence and therefore are located within the road reserve (managed by Parramatta City Council). Tree 6 is located within the site for the proposed substation. Trees 5 and 6 are Brush Box and tree 7 is a Swamp Oak. Tree 6 is in moderate form and health. Trees 5 and 7 are in good form and health.

The proposed removal of three planted trees for the driveway would have a negligible impact on native flora and fauna within the locality. The vegetation that would be impacted by the proposal does not contain any significant fauna habitats, and equivalent vegetation areas are widespread throughout the study area surroundings. The proposed vegetation clearing/disturbance would be unlikely to affect the persistence of any local populations of native fauna.

Tree and root protection
Trees 4 (Blackwood) and 8 (Lemon-scented Gum), which occur on either side of the proposed driveway, would require protection during tree removal and driveway construction. Ground disturbance or excavation within the tree protection and structural root zones of these trees could disturb the health and stability of the trees.

Tree 17 (White Cedar), located outside the north-western corner of the proposal site, should also be protected, if practicable.

Ground disturbance may result in the disturbance of tree roots. The majority of the ground disturbance would be undertaken within the cleared area of the site or within the paved area of Railway Parade, with the exception of the connection point into the stormwater system, and the connection point into the water main. These activities may impact on the tree protection and structural root zones of trees 4, 9, 12, 13, 14 and 15 (refer to Figure 7.1).
Trees 9 to 16, which occur along the southern boundary of the proposal site, would also need to be protected during construction. In particular, trees 9 (Brush Box) and 13 (Port Jackson Fig) are likely to have structural root zones that extend into the proposal site, and may be affected by construction activities. Tree 13 has two surface roots that extend from the leader towards the proposal site that may require pruning (refer to Photo 7.3).

Photo 7.3 Surface roots extending from Tree No. 13 into the site

Mitigation measures for the protection of retained trees are provided in section 7.2.4. Any impacts associated with the connection and installation of on-site services are expected to be restricted to shallow roots only. With the implementation of appropriate mitigation measures and controls as detailed in section 7.2.4, impacts are expected to be temporary and minor.

Significance of impacts
The proposal would not have a significant impact on any threatened species, population or ecological communities listed under the TSC Act and consequently a Species Impact Statement is not required.

The proposal site does not contain any threatened ecological communities or habitat for threatened or migratory species listed under the EPBC Act. The proposal would not have a significant impact on threatened or migratory biota listed under the EPBC Act and there is no requirement for referral to the Australian Minister for the Environment based on ecological grounds.

7.2.4 Mitigation measures

Construction
The following mitigation measures would be implementation during construction:

- Access to the site and the extent of vegetation clearing would be restricted to the access driveway (as shown in Figure 5.1 and Figure 7.1).
- The CEMP and construction plans would clearly document the location and full extent of the vegetation disturbance required. These areas would be clearly marked to avoid disturbance to adjacent retained vegetation, and exclusion fencing would be installed around trees to be retained.
• The trees proposed for removal would be replaced and/or offset in accordance with Transport for NSW’s Vegetation Offset Guide unless otherwise agreed with or directed by Transport for NSW.

• Approval would be obtained in accordance with Transport for NSW’s Application for Removal or Trimming of Vegetation for the trimming, cutting, pruning or removal of trees or vegetation where the impact has not been identified in this REF.

• Consultation with Parramatta City Council would be undertaken and any necessary approvals obtained prior the removal of trees 5 and 7.

• A vegetation management sub-plan would be prepared as part of the CEMP. It would include the following measures:
  – The management of trees that are being retained would be consistent with the Australian Standard AS4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).
  – Tree removal, maintenance and protection work would be undertaken by a qualified arborist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of five years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.
  – The following activities would be excluded from the tree protection zones of retained trees:
    ▪ storage of materials, plants or equipment
    ▪ installation of site sheds or portable toilets
    ▪ excavations, trenching, ripping or cultivation of soils
    ▪ modification of existing soil level or addition of fill materials
    ▪ disposal of waste materials and chemicals (both solid or liquid)
    ▪ mechanical removal of vegetation
    ▪ pedestrian or vehicular movement.
  – Tree protection zones and associated controls, storage and movement restrictions would be implemented for trees 4, 8, and 17 as outlined in Appendix C.
  – A protective fence would be installed and maintained between the proposal site and trees 9 to 16.
  – Tree 13 would be retained and protected.
  – If works are required within the tree protection zones, they would be restricted to the area outside of the structural root zone to avoid disturbing the stability and health of the trees.
  – Any root pruning required within the structural root zone would be approved and conducted by the project arborist. Any digging and pruning of roots within the structural root zone would be conducted by hand for a clean cut. Only roots with a diameter of less than five centimetres would be pruned.
  – Once construction is complete, retained trees would be re-inspected by the project arborist and, where necessary, remedial work (as outlined in Appendix C) would be undertaken to reduce the risk to people and property.

• Any vegetation planted on-site would consist of locally endemic native species, unless otherwise agreed with Transport for NSW, following consultation with Parramatta City Council where relevant, and/or Sydney Trains.
• Weed control mitigation and management strategies would be documented and implemented in accordance with the *Noxious Weeds Act 1993*. This would include procedures to reduce the spread of weeds via vehicles and machinery, such as visual inspection of vehicles prior to exit from site to ensure they are clear of plant material.

• Weeds would be managed and disposed of in accordance with the requirements of the *Noxious Weeds Act 1993* and/or the *Weeds of National Significance Weed Management Guide*.

**Operation**

No mitigation measures are required.

### 7.3 Noise and vibration

A noise and vibration assessment of the proposal was undertaken by GHD. The results of this assessment are summarised below. The full assessment report is provided in Appendix D.

#### 7.3.1 Assessment approach and methodology

The noise and vibration assessment involved the following:

- Background noise monitoring was undertaken at a single location (in the yard of the house located at 96 Railway Parade) considered to be representative of surrounding receivers. A description of the noise monitoring methodology is provided in section 2.2.1 of Appendix D.

- An assessment of the potential for construction noise and vibration impacts was undertaken in accordance with:
  - *Road Noise Policy* (DECCW, 2011)

- An assessment of the potential for operation noise impacts was undertaken in accordance with the *Industrial Noise Policy* (EPA, 2000).

Further information on the assessment approach and detailed results are provided in sections 4 and 5 of Appendix D.

#### 7.3.2 Existing environment

Noise and vibration sensitive receivers were defined based on the type of occupancy and the activities undertaken. The nearest sensitive receivers and land uses to the proposal site are residences located along:

- Railway Parade
- The Avenue, about 50 metres south of the proposal site
- Jamieson Street, about 100 metres south-east of the proposal site.

A full list of the potentially sensitive receivers and land uses identified in the study area for the purpose of the assessment is provided in Table 2-1 of Appendix D. The location of the receivers and noise monitoring locations are shown on Figure 7.2.
The noise environment of the study area is dominated by road noise and the movement of trains along the rail corridor. A summary of the measured noise levels at the monitoring location is provided in Table 7.1. The results show that the rating background level for the evening period is higher than that of the daytime period. This is likely to be a result of peak hour traffic noise.

### Table 7.1 Average background and ambient noise levels

<table>
<thead>
<tr>
<th>Location of noise logger</th>
<th>Rating background level (dB(A)), 90th percentile $L_{A90(15min)}$</th>
<th>Ambient noise levels (dB(A)), $L_{Aeq(period)}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Day</td>
<td>Evening</td>
</tr>
<tr>
<td>96 Railway Parade</td>
<td>46</td>
<td>49</td>
</tr>
</tbody>
</table>

### 7.3.3 Noise and vibration criteria

Section 3 of Appendix D describes how the assessment criteria were derived for the following:

- construction noise management levels
- construction vibration – human comfort and structural damage
- operational noise – intrusive and amenity criteria
- traffic noise during construction and operation
- sleep disturbance during construction and operation.

Table 7.2 and Table 7.3 provide the construction and operation noise criteria for the proposal based on consideration of the guidelines listed in section 7.3.1. Table 7.4, Table 7.5 and Table 7.6 provide the vibration criteria for human comfort and structural damage. Safe working buffer distances to comply with the human comfort and structural damage criteria were sourced from the *Construction Noise Strategy* (Transport for NSW, 2012), and are presented in Table 7.7.

### Table 7.2 Proposal specific construction noise criteria

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Construction noise management level, $L_{Aeq(15min)}$ (dB(A))</th>
<th>Sleep disturbance screening test $L_{Amax}$ (external)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During standard recommended hours¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Highly noise affected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise affected</td>
<td>Outside of standard recommended hours²</td>
</tr>
<tr>
<td></td>
<td>Day 7 am to 8 am and 1 pm to 6 pm</td>
<td>Evening 6 pm to 10 pm Monday to Sunday &amp; public holidays</td>
</tr>
<tr>
<td></td>
<td>Evening 6 pm to 10 pm Monday to Sunday &amp; public holidays</td>
<td>Night 10 pm to 7 am, Monday to Saturday; 10 pm to 8 am Sunday &amp; public holidays</td>
</tr>
<tr>
<td>Residential receivers (R1 to R16)</td>
<td>56</td>
<td>75</td>
</tr>
</tbody>
</table>

Note 1: When evening or night time RBLs are greater than the daytime RBLs, the INP recommends that the daytime RBLs be used for assessment purposes.
### Table 7.3  Proposal specific operational noise criteria

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Time period</th>
<th>Amenity criteria (acceptable noise level)</th>
<th>RBL, $L_{A_{eq}(period)}$</th>
<th>Intrusive criteria, $L_{A_{eq}(15min)}$</th>
<th>Proposal specific noise criteria (external)</th>
<th>Sleep disturbance screening test (external)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential receivers</td>
<td>Day</td>
<td>55</td>
<td>46</td>
<td>51</td>
<td>$51 L_{A_{eq}(day)}$</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td>45</td>
<td>49 (46)</td>
<td>51</td>
<td>$45 L_{A_{eq}(evening)}$</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>40</td>
<td>43</td>
<td>48</td>
<td>$40 L_{A_{eq}(night)}$</td>
<td>$58 L_{A_{max}}$</td>
</tr>
</tbody>
</table>

Notes:
1. With consideration to the INP, ‘noise amenity area’ classification, the residential receivers surrounding the proposal site have been classified as ‘suburban’.
2. Attended observations during the site visit noted that there were no significant industrial noise sources in the area therefore no adjustments have been applied for the proposal.
3. When evening or night time RBLs are greater than the daytime RBLs, the INP recommends that the daytime RBLs be used for assessment purposes.

### Table 7.4  Human comfort intermittent vibration limits (BS 6472-1992)

<table>
<thead>
<tr>
<th>Receiver type</th>
<th>Period</th>
<th>Intermittent vibration dose value (m/s$^{1.75}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Preferred value</td>
</tr>
<tr>
<td>Residential</td>
<td>Day</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>0.13</td>
</tr>
<tr>
<td>Educational institutes</td>
<td>When in use</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Note 1: Day is between 7 am and 10 pm and night is between 10 pm and 7 am

### Table 7.5  Guidance on effects of vibration levels for human comfort (BS 5228-2 – 2009)

<table>
<thead>
<tr>
<th>Vibration level</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.14 mm/s</td>
<td>Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.</td>
</tr>
<tr>
<td>0.3 mm/s</td>
<td>Vibration might be just perceptible in residential environments.</td>
</tr>
<tr>
<td>1.0 mm/s</td>
<td>It is likely that vibration at this level in residential environments will cause complaints, but can be tolerated if prior warning and explanation has been given to residents.</td>
</tr>
<tr>
<td>10 mm/s</td>
<td>Vibration is likely to be intolerable for any more than a very brief exposure.</td>
</tr>
</tbody>
</table>

### Table 7.6  Guideline values for short term vibration on structures (DIN 4150-3:1999)

<table>
<thead>
<tr>
<th>Type of structure</th>
<th>Guideline values for velocity, (mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Hz to 10 Hz</td>
</tr>
<tr>
<td>Buildings used for commercial purposes, industrial buildings, and buildings of similar design.</td>
<td>20</td>
</tr>
<tr>
<td>Dwellings and buildings of similar design and/or occupancy.</td>
<td>5</td>
</tr>
<tr>
<td>Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (for example heritage listed buildings).</td>
<td>3</td>
</tr>
</tbody>
</table>

Note 1: At frequencies above 100 Hz the values given in this column may be used as minimum values.
Figure 7.2 Location of receivers in the vicinity of the proposal site and noise monitoring location
Table 7.7  Vibration buffer distances

<table>
<thead>
<tr>
<th>Activity</th>
<th>Human comfort</th>
<th>Structural damage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Heritage building/structure</td>
</tr>
<tr>
<td>Seven tonne compactor</td>
<td>50 m</td>
<td>20 m</td>
</tr>
<tr>
<td>10 tonne vibratory roller</td>
<td>66 m</td>
<td>27 m</td>
</tr>
<tr>
<td>Jackhammer(^1)</td>
<td>Avoid contact with structure</td>
<td>2 m (nominal)</td>
</tr>
<tr>
<td>Excavator</td>
<td>18 m</td>
<td>8 m</td>
</tr>
<tr>
<td>Piling (bored)(^1)</td>
<td>N/A</td>
<td>4 m (nominal)</td>
</tr>
<tr>
<td>Dozer</td>
<td>25 m</td>
<td>10 m</td>
</tr>
</tbody>
</table>

Note 1: These distances have been sourced from the *Construction Noise Strategy* (Transport for NSW, 2012)

7.3.4 Impact assessment

Construction noise

Table 7.8 lists the modelled construction worst case noise levels for all potential receivers, with positive values indicating exceedances of relevant criteria. The results of modelling indicate that the noise generated by construction is predicted to exceed the ‘highly noise affected’ noise management levels at all residential receivers.

The exceedances shown in Table 7.8 would be mitigated by implementing the standard noise mitigation measures provided by the *Construction Noise Strategy* (Transport for NSW, 2012) where feasible and reasonable (refer section 7.3.5). All potentially impacted receivers should be informed of the nature of the works, expected noise levels, duration of works and a method of contact.

The exceedances would be short-term and temporary, and limited to the duration of the construction period.

Table 7.8 Predicted worst case construction noise levels (dB(A)) for standard recommended hours

<table>
<thead>
<tr>
<th>Receiver ID and address</th>
<th>Standard recommended hours criteria</th>
<th>Site clearing and demolition works</th>
<th>Earthworks and compaction</th>
<th>Substation construction works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ground floor</td>
<td>First floor</td>
<td>Ground floor</td>
<td>First floor</td>
</tr>
<tr>
<td>R1 - 88 Railway Parade</td>
<td>56</td>
<td>71 (+15)</td>
<td>-</td>
<td>71 (+15)</td>
</tr>
<tr>
<td>R2 - 86 Railway Parade</td>
<td>56</td>
<td>71 (+15)</td>
<td>-</td>
<td>71 (+15)</td>
</tr>
<tr>
<td>R3 - 94 Railway Parade</td>
<td>56</td>
<td>71 (+15)</td>
<td>-</td>
<td>71 (+15)</td>
</tr>
<tr>
<td>R4 - 84 Railway Parade</td>
<td>56</td>
<td>70 (+14)</td>
<td>-</td>
<td>70 (+14)</td>
</tr>
<tr>
<td>R5 - 96 Railway Parade</td>
<td>56</td>
<td>69 (+13)</td>
<td>-</td>
<td>70 (+14)</td>
</tr>
</tbody>
</table>
### Receiver ID and address

<table>
<thead>
<tr>
<th>Receiver ID and address</th>
<th>Standard recommended hours criteria</th>
<th>Site clearing and demolition works</th>
<th>Earthworks and compaction</th>
<th>Substation construction works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ground floor</td>
<td>First floor</td>
<td>Ground floor</td>
</tr>
<tr>
<td>R6 - 78-82 Railway Parade</td>
<td>56</td>
<td>67 (+11)</td>
<td>68 (+12)</td>
<td>67 (+11)</td>
</tr>
<tr>
<td>R7 - 98 Railway Parade</td>
<td>56</td>
<td>68 (+12)</td>
<td>-</td>
<td>69 (+13)</td>
</tr>
<tr>
<td>R8 - 100 Railway Parade</td>
<td>56</td>
<td>67 (+11)</td>
<td>-</td>
<td>68 (+12)</td>
</tr>
<tr>
<td>R9 - 72 Railway Parade</td>
<td>56</td>
<td>57 (+1)</td>
<td>-</td>
<td>58 (+2)</td>
</tr>
<tr>
<td>R10 - 108 Railway Parade</td>
<td>56</td>
<td>63 (+7)</td>
<td>-</td>
<td>64 (+8)</td>
</tr>
<tr>
<td>R11 - 70 Railway Parade</td>
<td>56</td>
<td>56 (0)</td>
<td>-</td>
<td>57 (+1)</td>
</tr>
<tr>
<td>R12 - 110 Railway Parade</td>
<td>56</td>
<td>62 (+6)</td>
<td>-</td>
<td>63 (+7)</td>
</tr>
<tr>
<td>R13 - 112 Railway Parade</td>
<td>56</td>
<td>62 (+6)</td>
<td>-</td>
<td>63 (+7)</td>
</tr>
<tr>
<td>R14 - 6 The Avenue</td>
<td>56</td>
<td>66 (+10)</td>
<td>-</td>
<td>67 (+11)</td>
</tr>
<tr>
<td>R15 - 8 The Avenue</td>
<td>56</td>
<td>65 (+9)</td>
<td>-</td>
<td>66 (+10)</td>
</tr>
<tr>
<td>R16 - 2 Jamieson Street</td>
<td>56</td>
<td>64 (+8)</td>
<td>66 (+10)</td>
<td>65 (+9)</td>
</tr>
</tbody>
</table>

Note: Red numerals – exceeds criteria

### Out of hours work and sleep disturbance

Some construction activities may be required to be undertaken outside of scheduled construction hours. These involve activities such as connection to the overhead wiring equipment and installation of certain electrical equipment, which would be undertaken during scheduled track possession periods.

These activities are not expected to cause adverse impacts at sensitive receivers. Noise monitoring would be conducted at the start of these works to determine compliance with out of hour works noise management levels and sleep disturbance criteria.

If out of hours work is required, the contractor would obtain approval from Transport for NSW, prior to works being undertaken. All out of hour works and activities would be undertaken with additional mitigation measures in accordance with the Construction Noise Strategy (Transport for NSW, 2012).
Traffic noise

In accordance with the Road Noise Policy (DECCW, 2011), construction traffic noise is considered to be acceptable when it is within two dB(A) of the existing noise levels. The doubling of traffic on a road is considered to generally result in an increase in noise levels of about three dB(A). Construction of the proposal would only result in a small increase in vehicles on the road network during construction (about 28 heavy vehicle and 30 light vehicle movements per day), which is a minor increase when compared with existing traffic levels (refer section 7.5.3). Therefore, the proposal would not result in any exceedance of the road traffic noise criteria.

Construction vibration

Human comfort

The assessment indicates that there would be the potential for some vibration (human comfort) impacts at sensitive receivers if compaction is undertaken within 66 metres of receivers (refer to Table 7.7). The potential for impacts would be mitigated by implementing the mitigation measures provided in section 7.3.5. Where practicable, activities with the potential to generate these impacts would be scheduled during standard construction hours. Sensitive receivers and land uses within the safe working distance buffers would be informed of the nature of the work, duration and contact details as part of the proposal communications strategy. Potential impacts would be short-term and temporary, and limited to the duration of the construction period.

Potential for building damage

The assessment indicates that the predicted magnitude of ground vibrations would not be sufficient to cause damage to any standard buildings located further than 13 metres from the proposal site (assuming use of a seven tonne compactor), or any heritage buildings located further than 20 metres from the proposal site. As there are no buildings within these distances, no vibration (building damage) impacts are anticipated during construction.

Any vibration generating activities associated with the site compound and laydown areas may have the potential to impact on nearby residential buildings and other sensitive structures. The mitigation measures provided in section 7.3.5 would be implemented to ensure that any vibration generated would be below the criteria limits.

Operation

Potential operational noise sources would include:

- two rectifier transformers (5.35 MVA)
- two rectifiers (5 MW)
- one power transformer (6.25 MVA)
- two auxiliary transformers (50 KVA)
- direct current circuit breakers (DCCB).

As rectifier and transformer noise levels fluctuate with loading, worst-case noise levels have been used for assessment purposes, even though it is unlikely that the transformers would be under maximum load during the night time period.

Operational noise levels were modelled for two separate scenarios as follows:

- Scenario 1: Rectifier and transformers operating - for assessment against the LA_{eq}(night) amenity noise criteria.
Scenario 2: Substation DCCB tripping - for assessment against the external sleep disturbance screening of $L_{A_{max}}$ 58 dB(A).

It is noted that DCCB tripping is a very infrequent event, with about three to five openings within a substation per year.

Table 7.9 and Table 7.10 outline the worst case noise level results of the modelling for both scenarios at the identified receptors. Positive values indicate exceedances, and negative values indicate that the criteria have been met. The results indicate that operational noise from the proposal is predicted to comply with the noise criteria at all surrounding sensitive receivers during general operations.

For scenario 2, during DCCB tripping, the sleep disturbance criteria are predicted to be exceeded at most residential receivers. However, as noted above, DCCB tripping is a very infrequent event and is not anticipated to adversely impact surrounding residences. The risk of DCCB tripping is further reduced as additional substations are developed. The concept design has sought to minimise the potential for noise impacts as a result of DCCB tripping, by locating the switchroom housing the DCCBs to the northern side of the substation compound further away from Railway Parade.

**Table 7.9 Predicted operational noise levels during normal operations (dB(A))**

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Operational criteria $L_{A_{eq\text{[night]}}}$</th>
<th>Predicted noise levels ($L_{A_{eq\text{[night]}}}$) at each receiver height</th>
<th>Ground floor (1.5 m)</th>
<th>First floor (4.5 m)</th>
<th>Second floor (7.5 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>40</td>
<td>35 (-5)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R2</td>
<td>40</td>
<td>36 (-4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R3</td>
<td>40</td>
<td>37 (-3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R4</td>
<td>40</td>
<td>36 (-4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R5</td>
<td>40</td>
<td>35 (-5)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R6</td>
<td>40</td>
<td>35 (-5)</td>
<td>36 (-4)</td>
<td>37 (-3)</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>40</td>
<td>33 (-7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R8</td>
<td>40</td>
<td>32 (-8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R9</td>
<td>40</td>
<td>26 (-14)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R10</td>
<td>40</td>
<td>30 (-10)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R11</td>
<td>40</td>
<td>25 (-15)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R12</td>
<td>40</td>
<td>29 (-11)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R13</td>
<td>40</td>
<td>28 (-12)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R14</td>
<td>40</td>
<td>33 (-7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R15</td>
<td>40</td>
<td>32 (-8)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>R16</td>
<td>40</td>
<td>33 (-7)</td>
<td>34 (-6)</td>
<td>35 (-5)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Green – meets criteria
Table 7.10 Predicted operational noise levels during DCCB tripping (dB(A))

<table>
<thead>
<tr>
<th>Receiver</th>
<th>Sleep disturbance screening test, L_{Amax}</th>
<th>Predicted noise levels (L_{Amax}) at each receiver height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ground floor (1.5 m)</td>
</tr>
<tr>
<td>R1</td>
<td>58</td>
<td>69 (+11)</td>
</tr>
<tr>
<td>R2</td>
<td>58</td>
<td>69 (+11)</td>
</tr>
<tr>
<td>R3</td>
<td>58</td>
<td>55 (-3)</td>
</tr>
<tr>
<td>R4</td>
<td>58</td>
<td>68 (+10)</td>
</tr>
<tr>
<td>R5</td>
<td>58</td>
<td>66 (+8)</td>
</tr>
<tr>
<td>R6</td>
<td>58</td>
<td>65 (+7)</td>
</tr>
<tr>
<td>R7</td>
<td>58</td>
<td>65 (+7)</td>
</tr>
<tr>
<td>R8</td>
<td>58</td>
<td>64 (+6)</td>
</tr>
<tr>
<td>R9</td>
<td>58</td>
<td>61 (+3)</td>
</tr>
<tr>
<td>R10</td>
<td>58</td>
<td>60 (+2)</td>
</tr>
<tr>
<td>R11</td>
<td>58</td>
<td>60 (+2)</td>
</tr>
<tr>
<td>R12</td>
<td>58</td>
<td>59 (+1)</td>
</tr>
<tr>
<td>R13</td>
<td>58</td>
<td>63 (+5)</td>
</tr>
<tr>
<td>R14</td>
<td>58</td>
<td>63 (+5)</td>
</tr>
<tr>
<td>R15</td>
<td>58</td>
<td>63 (+5)</td>
</tr>
<tr>
<td>R16</td>
<td>58</td>
<td>63 (+5)</td>
</tr>
</tbody>
</table>

Note: Red – exceeds criteria, Green – meets criteria

Traffic noise

Staff will occasionally access the site out of normal business hours to perform maintenance works. Vehicle movements associated with servicing and maintenance will be infrequent and are not expected to cause noise impacts in a suburban area. Therefore no operational traffic noise impacts are anticipated at sensitive receivers.

Operation vibration

There would be no vibration impacts associated with the operation of the proposal.

7.3.5 Mitigation measures

Construction

- Mitigation measures documented in Construction Noise Strategy (Transport for NSW 2012) would be adopted where feasible and reasonable, as specified in Tables 6-1 and 6-2 of Appendix D.

- A noise and vibration management plan would be prepared as part of the CEMP in accordance with the Construction Noise Strategy (Transport for NSW, 2012) and the Interim Construction Noise Guideline (DECC, 2009). It would include the following measures:
  - Sensitive receivers would be identified and marked on plans.
  - Works would be scheduled during recommended standard hours where practicable.
  - All equipment and construction methodologies would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and be in good...
working order. Machines found to produce excessive noise compared to normal industry expectations would be removed from the site or stood down until repairs or modifications can be made.

– All site workers would be educated as to the potential for noise impacts on sensitive receivers and land uses and encouraged to take practical and reasonable measures to minimise impacts during the course of their activities. This would include:
   toolbox talks covering avoiding the use of outdoor radios during the night period
   avoiding shouting and slamming doors
   where practicable, machines would be operated at low speed or power and would be switched off when not being used, rather than left idling for prolonged periods
   avoiding dropping materials from height and metal to metal contact where practicable.

– Truck drivers would be informed of designated vehicle routes, parking locations and the requirement to minimise engine idling.

– Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on construction vehicles and mobile plant regularly used on-site and for any out of hours work.

– Where noise and vibration levels during the works are predicted to exceed acceptable levels after implementation of general work practices, the additional mitigation measures included in Table 6-1 and 6-2 of Appendix D would be implemented where reasonable and feasible.

– Nearby receivers would be notified of the works prior to commencement. Notification would include expected noise levels, duration of the works and a method of contact (Transport for NSW’s 1800 775 465 number).

– A process for complaints management as outlined in section 6.4.1.

• If out of hours works are required, the contractor would prepare and submit a Transport for NSW Out of Hours Work Assessment (3TP-PR-065) and Application Form (9TP-FT-079) for approval prior to the works being undertaken. All out of hour works and activities would be undertaken with additional mitigation measures in accordance with the Construction Noise Strategy (Transport for NSW, 2012).

• Where construction is required within the safe working buffer distance, alternative work methods such as smaller equipment would be considered. If no alternative work method is feasible or reasonable, then compliance vibration monitoring would be undertaken including:
  – Site tests to review the measured frequency content to determine the structural damage criteria as per Table 3-6 and Table 3-7 of the Noise and Vibration assessment (Appendix D) for standard dwelling and for heritage structures respectively.
  – Continuous vibration monitoring with a visual alarm installed to warn the equipment operator when the structural damage vibration criteria (considering frequency content) is exceeded.

**Operation**

• Transformers, rectifiers and other electrical equipment on site would be well maintained and operated according to specifications.

• Operational noise monitoring would be undertaken at regular periods to assess compliance against operational noise criteria.
If the results of monitoring indicate that operational noise levels are significantly higher than those modelled for the REF, the use of mufflers or other acoustic treatment methods would be investigated.

• Maintenance operations would be scheduled during the day.
• Any noise complaints would be managed in accordance with the process for complaints management outlined in section 6.4.1.

7.4 Air quality

7.4.1 Existing environment

A search of the National Pollutant Inventory undertaken on 19 June 2015 for the 2013 to 2014 reporting period identified 36 air pollutant substances from 10 sources in Granville and the surrounding suburbs. The closest source identified is Downer EDI Works Pty Ltd located at Unwin Street, Rosehill, about 1.5 kilometres north-east of the proposal site.

Other contributors to air quality within the study area would include emissions from motor vehicles on the surrounding road network, and the diesel freight trains on the adjoining rail corridor.

The nearest sensitive receivers include residential properties along Railway Parade opposite the site.

7.4.2 Impact assessment

Construction

The proposal would have minimal impact on air quality as it would not involve substantial clearing, earthworks or other land disturbance with the potential to generate significant quantities of dust. Small amounts of dust may be produced by the excavation associated with piling, and the movement of construction vehicles.

Dust could impact on the amenity of people in nearby buildings or passing the proposal site. Due to the small amount of dust expected and the relatively short duration of works, these impacts are considered to be minimal.

Operating plant, machinery and trucks may also increase exhaust emissions in the study area; however these impacts would be minor and short-term.

Implementing standard air quality management controls (listed in section 7.4.3) would minimise the potential for air quality impacts.

Operation

Air quality

The operation of the proposal would not result in any significant air quality impacts.

Greenhouse gases

Sulphur hexafluoride gas (SF₆) would be used as an insulator within the new switchgear. SF₆ has the potential to contribute to greenhouse gas emissions as it has a high greenhouse gas equivalence of 23,900 times that of carbon dioxide. SF₆ is sealed within gas-tight compartments inside the switchgear. However, leakage could occur during maintenance activities or through poor work practices. This would be managed by the mitigation measures proposed in section 7.4.3.
7.4.3 Mitigation measures

Construction
An air quality management sub-plan would be prepared as part of the CEMP. It would include the following measures:

- All plant and machinery would be fitted with emission control devices complying with the Australian Design Standards.
- Machinery would be turned off when not in use and not left to idle for prolonged periods.
- Vehicle movements would be limited to designated entries and exits, haulage routes (to be determined during preparation of the traffic management plan, and in consultation with Roads and Maritime Services and Council) and parking areas.
- Dust generation would be monitored visually, and where required, dust control measures such as water spraying would be implemented to control the generation of dust.
- Any waste produced on-site would be stored and stockpiled for removal off-site daily, to reduce the production of dust.
- Materials transported to and from the site would be covered to reduce dust generation in transit.
- Access points would be inspected to determine whether sediment is being transferred to the surrounding road network. If required, sediment would be promptly removed from roads to minimise dust generation.
- Stabilising any excavated areas as soon as practicable.
- Stockpile management would be undertaken in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004).
- Material stockpiles awaiting removal from site that are inactive for a period of greater than one week would be stabilised (seeded or covered).
- Fixed hoses would be used to dampen exposed surfaces to minimise dust generation, where required.
- Shade cloth would be fastened to the perimeter fence on the proposal site to minimise dust transported from the site during construction.

Operation
No mitigation measures are required.

7.5 Traffic and transport

This section provides an assessment of the potential traffic and transport impacts associated with construction and operation of the proposal.

7.5.1 Assessment approach and methodology
The traffic impact assessment involved the following by a GHD traffic engineer:

- a site visit and observations of the road network and transport environment surrounding the proposal site
- reviewing the traffic and pedestrian environment
- investigating the transport network in the study area
• reviewing the information available on the proposed construction method and estimates of traffic generation during construction and operation
• assessing the potential impacts of construction and operation, including an assessment of potential traffic generation, parking, access and road safety
• providing recommendations in relation to management measures.

7.5.2 Existing environment

Road network

The road network in the vicinity of the proposal site is shown in Figure 1.1 and is described below. The proposal site is accessed via Railway Parade. The signalised intersection of Railway Parade, Carlton Street and Bold Street is located about 150 metres east of the proposal site.

Traffic generators located in the vicinity of Railway Parade include the Granville TAFE, Granville Public School, Granville Boys High School and Granville Station.

Parramatta Road

Parramatta Road is an arterial road which forms part of the Great Western Highway route A44, connecting Parramatta to Haymarket. It provides a local link to the M4 Western Motorway at Church Street/Woodville Road. The carriageway is mostly undivided with between two and three lanes in each direction along the length of the route and a sign posted speed limit of 60 km/h.

Woodville Road

Woodville Road is an arterial road connecting Villawood to Granville. It provides a link between the Hume Highway and the M4 Western Motorway at Church Street. The carriageway is mostly divided with between two and three lanes in each direction along the length of the route and a sign posted speed limit of 70 km/h.

Bold Street

Bold Street, which includes a bridge over the rail corridor, connects with Parramatta Road about 200 metres to the north. The carriageway is undivided with one lane in each direction and a posted speed limit of 60 km/h.

Railway Parade

Railway Parade is a local road that terminates at a cul-de-sac to the west. The carriageway is undivided with a speed limit of 50 km/h.

Jamieson Street

Jamieson Street is a local road connecting to Railway Parade via a priority controlled intersection. The carriageway is undivided with one lane in each direction and a speed limit of 50 km/h.

The Avenue

The Avenue is a local road connecting to Railway Parade via a priority controlled intersection. The carriageway is undivided with one lane in each direction and a speed limit of 50 km/h.

Parking

In the vicinity of the proposal site, parking along Railway Parade is unrestricted on the northern side of the road with dedicated parking bays provided. On the southern side of Railway Parade, parking is restricted to two hours between 8 am and 6 pm Monday to Friday. A car park with
around 50 spaces is available at Granville Branch Library, which is located on Jamieson Street, around 300 metres from the proposal site.

**Pedestrian access**

A 2.5 metre wide footpath is provided on the southern side of Railway Parade. There are no formal footpath facilities on the northern side of Railway Parade.

**Public transport**

There is a bus stop/zone located on the northern side of Railway Parade outside the proposal site (see Photo 7.4). The bus stop is for the M91 Hurstville to Parramatta route towards Hurstville, which is operated by Transdev. The M91 bus route forms part of Sydney’s Metrobus network. Metrobus is a high frequency, high capacity bus network that links key employment and growth centres. Buses operate with a 10 minute frequency during peak periods, every 15 minutes during the weekday off-peak, and 20 minutes in the evening and on weekends.

Granville Station is located about 150 metres to the east of the proposal site. Granville Station is served by Sydney Trains T1 Western Line and T2 South Line services and NSW TrainLink Blue Mountains Line services.

![Photo 7.4 Bus stop outside site](image)

**7.5.3 Impact assessment**

**Construction**

**Traffic generation**

Information regarding the proposed arrangements in terms of construction site access, parking and vehicle movements is provided in section 5.

Construction would generate heavy vehicle movements associated with the transportation of construction machinery, equipment and materials to and from the proposal site. Light vehicle movements would be associated with employees and smaller deliveries.

Construction vehicle movements would result in a temporary increase in traffic along the road network. An estimate of the potential construction traffic generation is provided in Table 5.1 in section 5.3.4.
The worst case period in terms of construction traffic generation would occur during concrete pours, which could result in about 16 movements per day. The estimated worst case scenario for truck movements during peak periods would be about four vehicle trips per hour comprising two in and two out movements.

It is assumed that most construction vehicles would access the proposal site via the following routes:

- Parramatta Road, Bold Street and Railway Parade
- Woodville Road, Williams Street, Lumley Street, Carlton Street and Railway Parade.

During the peak construction period, it is estimated that the proposal would generate an additional 36 vehicles per day on the road network. The surrounding road network would need to accommodate an additional 14 movements during the peak morning and peak evening periods.

The construction traffic that would be generated by the proposal would be a very small proportion of the existing traffic levels on the surrounding road network. This increase is not expected to result in any impacts on the operation of the road network.

**Construction access and oversized deliveries**

Construction of the proposal would require delivery of oversized pieces of equipment, such as transformers, rectifiers and poles. Oversized transport may also be required during decommissioning of the existing Granville Substation to remove larger items of equipment. These deliveries would be undertaken in consultation with relevant agencies and would generally be undertaken out of hours to minimise the potential for impacts to the surrounding road network. It is noted that there is currently a sign displaying ‘No through access for semi-trailers’ on the corner of The Avenue and Railway Parade.

Any semi-trailer movements entering and exiting the site would need to be under authorised traffic control in accordance with the requirements of *Traffic Control at Work Sites* (RTA, 2010).

**Public transport**

The bus stop outside the site can remain in its existing location, as long as the existing pad, bus zone and plinth remain in place, and buses are able to pull in parallel to the kerb in accordance with the Disability Standards for Accessible Public Transport 2002.

**Parking**

Parking for construction vehicles (including light vehicles) would be provided at the nominated construction compound (shown in Figure 5.1). Construction workers would be encouraged not to park in surrounding roads.

As noted in section 4.4.3, establishing a single driveway access to the site (for use during construction and operation) would result in the loss of two on-street parking spaces.

As noted in section 4.4.4, a temporary ‘no stopping zone’ would need to be established on Railway Parade on either side of the proposal site to control parking and allow safe entry to the site, in accordance with the requirements of Parramatta City Council. The distance occupied by the no stopping zone would be confirmed by the construction contractor. Commuter vehicles would not be able to park in the no stopping zone. This would result in the temporary loss of about two on-street parking spaces along the northern side of Railway Parade.

This loss of on-street parking is not considered to be significant, as it would be temporary and limited to the duration of the construction period. In addition, sufficient parking is available on the surrounding road network.
Pedestrian movements and access

Currently, formal pedestrian access is not available on the northern side of Railway Parade. There would be no impacts to pedestrian access on the southern side of the road.

Implementation of the construction traffic management sub-plan and the mitigation measures provided in section 7.5.4 would ensure that potential impacts to pedestrian movements and safety are minimised.

Operation

As noted in section 5.1.4 vehicular access to the proposal site would be via a new access gate off Railway Parade. This would result in the permanent removal of two on-street parking spaces.

Operation of the proposal would not result in any other impacts to traffic or access, as access for maintenance purposes would be infrequent (around two per month). Any semi-trailer movements entering and exiting the permanent driveway would need to be under authorised traffic control in accordance with the requirements of Traffic Control at Work Sites (RTA, 2010).

7.5.4 Mitigation measures

Construction

- A traffic management sub-plan would be prepared as part of the CEMP. It would include the following measures:
  - Traffic and access would be managed in accordance with Traffic Control at Work Sites (RTA, 2010) and in consultation with Roads and Maritime Services, Parramatta City Council and Holroyd City Council.
  - Residents, property owners would be notified of any access restrictions in advance of work commencing.
  - Appropriate traffic management controls would be implemented, including precautionary signs, illuminated warning devices, manual and/or electronic traffic control, and the provision of temporary barriers and markers, to control pedestrians and traffic access to and around the proposal site.
  - Safe access points to the proposal site would be established, including safety measures such as security fencing and/or barriers, maintaining sight distance requirements, signage and the provision of traffic management measures.
  - Detail of the required approvals and permits (Council and RMS) required to be obtained prior to works, including any approvals associated with temporary lane closures and / or speed reduction zones.
  - The requirements of the Roads Act 1993 would be followed at all times prior to and during all work (including notice requirements, consultation and consent/concurrence requirements for work within public and classified roads).
  - Heavy vehicles would be restricted to the specified routes.
  - Oversized deliveries would be undertaken in accordance with the requirements of Council, Roads and Maritime Services and NSW Police.
- In consultation with Parramatta City Council, consideration would be given to implementing eight tonne load restrictions on the local roads connecting with Railway Parade, including Jamieson Street, The Avenue, Smith Street, Margaret Street and Milton Street.
- The driveway access to the site would be designed in accordance with the requirements of the ASA standard for access roads (Transport for NSW, 2014) and in consultation with Parramatta City Council.
Operation

No mitigation measures are required.

7.6  Land use and social-economic issues

7.6.1  Existing environment

The existing land uses and zoning of the proposal site and surrounds are described in sections 2.2 and 3.2.2.

The community with the potential to be impacted by the proposal would include:

- local residents
- employees on adjacent sites
- commuters accessing Granville Station and parking along Railway Parade

Future land uses

The Parramatta Road Urban Renewal Strategy (Urban Growth NSW, 2015) has identified the area between Parramatta Road and the railway corridor in Granville (to the north of the site) as one of eight precincts for urban renewal and redevelopment. The Parramatta Road Urban Renewal Strategy does not specify zoning, height or density for the areas and these will be determined as part of a precinct planning process which is planned to be undertaken later this year.

7.6.2  Impact assessment

Construction

Land use

During construction, the land use would change from the existing use (as described in sections 2.2 and 3.2.2) to a construction site.

Community amenity impacts

The proposal has the potential to result in some impacts on the amenity of the surrounding community and/or users of adjoining areas during construction. This could include those properties located in close proximity to the proposal site. These potential impacts, which include noise, air quality, traffic and access, and visual impacts, are assessed in sections 7.3.4, 7.4.2, 7.5.3, and 7.7.2 respectively. No significant impacts are identified.

Operation

Land use

The proposal would involve the use of vacant land zoned for enterprise corridor use for an infrastructure (rail) use. This use is consistent with the land use zoning under the LEP, and is consistent with the use of adjoining land as rail corridor.

The decommissioning of the existing Granville substation would release this land for an alternate purpose in keeping with the infrastructure zoning of the site and surrounding area. Any future uses would be considered under a separate approvals process.

Community amenity impacts

The potential for operational impacts on amenity relate to the potential for noise, air quality, traffic and access, and visual impacts. These are assessed in sections 7.3.4, 7.4.2, 7.5.3, and
7.7.2 respectively. No significant long term impacts have been identified, other than the introduction of a new structure in the landscape.

Wider operational impacts

The proposal involves the provision of infrastructure required to meet the needs of the expanded Sydney Trains fleet, and is therefore consistent with the NSW Long Term Transport Master Plan. Operation of this proposal would improve service reliability by reducing the risk of disruption to rail services. This would have a socio-economic benefit to all communities with access to the North Shore, Northern and Western Line, and the Airport, Inner West and South Line.

7.6.3 Mitigation measures

Construction

The following mitigation measures would be implemented during construction:

- The CEMP would specify the approach to consultation during construction, the communication tools to be used, and response protocols. Specific consultation tasks to be undertaken include:
  - advising affected landholders of the proposal, the construction hours and duration of work, and supplying a contact number for any queries or complaints relating to the work
  - displaying accurate public information signs while work is in progress and until site restoration has been completed.

Operation

No mitigation measures are required.

7.7 Visual amenity

7.7.1 Existing environment

The visual landscape of the proposal site is dominated by rail infrastructure and services (including rail lines, overhead power lines and Sydney Trains buildings), the adjoining road network, existing trees along the site boundary, and residential uses opposite the site. Views to the site for the proposed substation are available from:

- Railway Parade – including traffic and pedestrians travelling along the road
- residences on the eastern side of Railway Parade
- train services (in particular passenger services) along the rail line.

Users of Railway Parade and residential receptors with direct views of the site are considered to be the most sensitive receptors. Views from these receivers to the site are currently dominated by vegetation, with partial views of railway infrastructure through the trees (refer Photos 7.5 and 7.6). Views to the site for the proposed substation are partially obscured by the trees located along the site boundary.
7.7.2 Impact assessment

Construction
During construction, the positioning of the work site and the site compound would result in some short-term impacts on the visual amenity for nearby sensitive receivers. Overall, the potential visual impacts of construction activities are considered to be minimal as the works would be temporary and short-term.

Operation
Potential visual impacts relate to the presence of a new structure in the landscape. An indicative description of the potential appearance of the proposal is provided in section 5.1.
Substations are common features/land uses in urban areas. The appearance of the substation would be consistent with the surrounding rail/infrastructure uses, which include existing buildings and other rail infrastructure (including overhead power lines). As noted above, views to the site are partially obscured by vegetation, so not all of the proposal will be visible from surrounding areas. The proposed removal of three trees to enable access to be provided to the site would enable views into the site from this area. At the location of the new access, the proposal would be visible from the street and residences across from the new access.

The concept design for the proposal has been prepared with regard to urban design and visual considerations. Further design phases would continue to consider the potential for visual impacts.

Photomontages of the proposed substation from the nearest sensitive viewpoints are provided in Figure 7.3 to Figure 7.5.

**Figure 7.3** Photomontage of the proposed substation from Railway Parade opposite the site access looking north-west

**Figure 7.4** Photomontage of the proposed substation from Railway Parade opposite the south-western corner of the site looking north-east
7.7.3 Mitigation measures

Construction

The following mitigation measures would be implemented to minimise impacts during construction:

- Shade cloth or similar material would be attached to the site fencing to minimise views of the worksite.
- The worksite would be left in a tidy manner at the end of each work day.

Operation

The following mitigation measures would be implemented to minimise impacts during operation:

- The detailed design of the proposal would take into account relevant urban design and visual considerations.

7.8 Heritage

7.8.1 Existing environment

Aboriginal heritage

A search of the Aboriginal Heritage Information Management System was undertaken on 25 June 2015. This search identified that there are no known Aboriginal heritage items located either within the proposal site or within a 200 metre radius of the site.

Non-Aboriginal heritage

A search of the following heritage registers was undertaken for the suburb of Granville on 18 June 2015:

- State Heritage Register
- Section 170 registers for state agencies
- *Parramatta Local Environmental Plan 2011*
- Australian heritage database.
The nearest heritage listed items (within 300 metres of the site) are listed in Table 7.11. No heritage listed items are located within or in the immediate vicinity of the proposal site.

### Table 7.11 Heritage items within the study area

<table>
<thead>
<tr>
<th>Name</th>
<th>Listing</th>
<th>Approximate distance from the proposal site</th>
</tr>
</thead>
<tbody>
<tr>
<td>House – 70 Railway Parade</td>
<td>Parramatta Local Environmental Plan 2011</td>
<td>120 metres south-east of the proposal site</td>
</tr>
<tr>
<td>Substation No. 1 - 176A Parramatta Road</td>
<td>Parramatta Local Environmental Plan 2011</td>
<td>150 metres north-east of the proposal site</td>
</tr>
<tr>
<td>House – 5 Margaret Street</td>
<td>Parramatta Local Environmental Plan 2011</td>
<td>160 metres west of the proposal site at its nearest point</td>
</tr>
<tr>
<td>House – 28 The Avenue</td>
<td>Parramatta Local Environmental Plan 2011</td>
<td>180 metres south of the proposal site</td>
</tr>
<tr>
<td>29 Jamieson Street</td>
<td>Section 170 State agency heritage register Parramatta Local Environmental Plan 2011 Australian Heritage database</td>
<td>230 metres south of the proposal site at its nearest point</td>
</tr>
<tr>
<td>Granville Town Hall</td>
<td>Parramatta Local Environmental Plan 2011</td>
<td>240 metres south west of the proposal site</td>
</tr>
</tbody>
</table>

### 7.8.2 Impact assessment

The proposal would not result in any impacts to listed/known Aboriginal or non-Aboriginal heritage items. Mitigation measures provided in section 7.8.3 would be implemented to ensure heritage listed items within proximity to the works are not impacted during construction.

As the study area has been substantially modified by urban development and subject to previous ground disturbance (associated with construction of the road and rail corridor), the risk of encountering any unknown heritage items is considered to be extremely low.

### 7.8.3 Mitigation measures

#### Construction

The following mitigation measures would be implemented to minimise impacts during construction:

- All heritage items in the immediate vicinity of the proposal site would be marked on site plans, and avoided.
- A heritage induction would be provided to all workers before construction commences informing them of the location of heritage items within the study area and guidelines to follow if unanticipated heritage items or deposits are located during construction.
- If previously unidentified indigenous or non-indigenous heritage/archaeological items are uncovered during construction works, all works in the vicinity of the find shall cease and the Transport for NSW Project Manager and Environmental Planning Manager (EPM) notified. Appropriate advice shall be sought from a suitably qualified heritage consultant/archaeologist (and in consultation with the relevant division of OEH, as required). Works in the vicinity of the find shall not re-commence until clearance has been received from the heritage consultant/archaeologist and the Transport for NSW EPM.
No mitigation measures are required.

## 7.9 Electromagnetic energy

An electromagnetic energy report for the proposal was undertaken by EMC Services Pty Ltd in July 2015. The results of this assessment are summarised below. The full assessment report is provided in Appendix E.

### 7.9.1 Impact assessment

Electromagnetic energy (EME) is invisible and found everywhere electricity is present. An electric field is a region where electric charges experience an invisible force. The strength of this force is related to the voltage, or the pressure which forces electricity along wires. Electric fields are strongest close to their source, and their strength diminishes rapidly as we move away from the source.

A magnetic field is a region where magnetic materials experience an invisible force produced by the flow of electricity, commonly known as current. Unlike electric fields, magnetic fields are only present when electric current is flowing.

The strength of a magnetic field depends on the size of the current (measured in amps), and decreases rapidly once we move away from the source. While electric fields are blocked by many common materials, this is not the case with magnetic fields.

There are two components to an electromagnetic field, the electric field strength which is very weak at the proposed voltage (1500 volts) and the magnetic field strength which decreases in an inverse square relationship close to the source and at a higher rate approximating an inverse cubic relationship at further distances.

In recent years there has been an increase in community concerns over the long-term health effects on people living and working near power lines and facilities, particularly high voltage power lines. The Australian Radiation and Nuclear Protection Safety Agency (ARPANSA) has published on its website a draft standard for exposure to magnetic fields which advocates a full-time exposure limit of 100 microtesla (a microtesla is a unit of measurement for magnetic strength), and a higher value for occupational exposure.

An assessment of the potential electromagnetic fields for the proposal was undertaken by EMC Services. This assessment found that the strongest magnetic field in a public area is predicted to be outside at the western security fence of the substation. The strengths were not found to exceed the permissible exposure limit of 100 microtesla for the general public. The electric fields within and outside the substation were also within the acceptable limit. The magnetic field drops off rapidly as the separation distance is increased.

Inside the substation building, within 0.5 and 1.1 metres of the 600 volt cabling between the transformer and the rectifier, the power frequency magnetic field is predicted to exceed the limits of 100 microtesla for the general public, and 500 microtesla for occupational personnel, respectively. However, these areas would be fenced off and would only be accessed by appropriately qualified persons.

Without accounting for shielding within the substation, when the substation is fully loaded, the radio frequency electric fields within 65 metres of the substation would not exceed the applicable limit for urban broadcast reception. Within 65 metres of the substation, radio receptions would be impacted, especially for AM reception and high frequency frequency bands. These levels would be reduced somewhat once shielding from the substation building is factored. Given the rail track is more than 30 metres from the 600 volt cabling in the substation,
there would be a low to medium risk for any train communication system which may operate over the medium to high frequency bands. The proposal is not expected to result in any interference to FM radio or television signals as the increase in EME would not significantly add to the existing ambient environment.

Considering the substation floor plan and the typical use of general electronic equipment in the areas, the risk of interference to general electronic equipment would be very low.

7.9.2 Mitigation measures

Construction

No mitigation measures are required.

Operation

The following mitigation measures would be implemented during operation to manage electromagnetic energy:

- During detailed design and commissioning of the substation, detailed analysis and monitoring would be undertaken to determine the electromagnetic energy levels within and outside the substation. Should exceedances of the criteria be found, methods to reduce these exceedances would be implemented.
- The risk of interference to MF band (500 kHz to 3 MHz) radio or communications receiver equipment within 30 metres of the 600 volt cabling would be mitigated by increasing the distance separation between the cabling and the rail track, or by installation of magnetic shielding. This would be determined during detailed design.

7.10 Waste and hazardous materials

7.10.1 Existing environment

The existing contamination status of the site for the proposed substation was described in section 7.1.1.

Based on previous surveys of substation buildings undertaken for other projects (GHD, 2014), the following potentially hazardous and/or contaminated material may be located at the existing substation site:

- equipment containing oil
- asbestos-containing materials
- synthetic mineral fibre
- lead-based paint
- lead dust
- polychlorinated biphenyl (PCBs)
- CFC and HCFC refrigerants.

7.10.2 Impact assessment

Construction of the proposed substation

The main waste generated during construction would be excess spoil (up to about 1200 cubic metres) from excavations. General waste, such as surplus pipe and cabling associated with connecting the site to services would also be produced. Careful planning of construction activities would ensure that the volume of surplus materials is minimised. The small scale of the
proposals means that only a small volume of waste is likely to be generated in comparison to other larger infrastructure construction projects.

The proposal has the potential to disturb buried asbestos during works at the site for the proposed substation.

The fit out stage would also generate small volumes of waste associated with off cuts from communications and electrical cables.

Given the preliminary waste classification data (i.e. special waste asbestos – refer to section 7.1.1), contaminated materials may be encountered during construction. To ensure the safety of the community and construction personnel, appropriate measures would be implemented to manage, remediate and dispose of contaminated materials. Measures to manage contaminated materials are provided in section 7.1.3. Measures to manage waste and hazardous materials are provided in section 7.10.3.

**Decommissioning and removal of the existing Granville Substation**

Potentially hazardous and/or contaminated material and spoil may be encountered during the works as noted in section 7.10.1. These materials have the potential to result in health impacts for construction workers and the general public if works within the substation are not undertaken using the correct methods. The mitigation measures outlined in section 7.1.3 and 7.10.3 would be implemented to ensure that impacts of hazardous materials is minimised.

All decommissioning and demolition wastes would be appropriately managed through the implementation of measures provided in section 7.10.3. All waste would be collected and stored on the existing substation site, prior to disposal in accordance with relevant Sydney Trains’ guidelines and the *Waste Classification Guidelines* (EPA, 2014).

**Operation**

The only waste generated during operation would be related to periodic maintenance and general personnel waste. This would include materials such as electrical wiring that would be disposed of in accordance with Sydney Trains’ existing procedures and the *Waste Classification Guidelines* (EPA, 2014).

**7.10.3 Mitigation measures**

**Construction**

The following mitigation measures would be implemented during construction:

**Waste management**

- Wastes generated by the proposal would be managed in accordance with the *Waste Classification Guidelines* (EPA, 2014) and in accordance with the waste minimisation hierarchy as follows:
  - avoidance, where possible
  - treated, as required and reused on-site
  - recycled, either within the process or off-site
  - where other alternatives are not possible, wastes would be disposed of at appropriately licensed waste management facilities.

**Hazardous materials**

A hazardous materials management plan would be prepared as part of the CEMP. It would include the following measures:
• The removal, handling and disposal of any asbestos waste would be undertaken by an appropriately licensed contractor, and in accordance with:
  – *Code of Practice for the Safe Removal of Asbestos 2005*
  – *Code of Practice for the Management and Control of Asbestos in Workplaces 2005*.
• An occupational hygienist would be responsible for conducting asbestos fibre air monitoring, visual clearance inspections and issuing clearance certificates after the completion of any removal works.
• Work would cease in the vicinity of any potential asbestos materials which have not been previously identified. The material would be analysed for the presence of asbestos. In the event the material is disturbed prior to work ceasing, the provisions of an Asbestos Removal Control Plan or similar would be followed, including seeking advice from a suitably qualified and experienced professional.
• Lead dust would be removed from the substation building by a qualified hazardous material removal contractor and should be subject to ongoing monitoring and inspections by an Occupational Hygienist to ensure compliance with the relevant legislation and Australian Standards.
• All known and presumed occurrences of polychlorinated biphenyl’s would be handled and disposed of in accordance with the procedure documented within ANZECC *Identification of PCB-containing Capacitors – An information booklet for electricians and electrical contractors 1997*. Removal would be undertaken by a suitable licenced hazardous material removal contractor and would be disposed of to a suitably licenced facility.
• In the event synthetic material fibres are found on site, they would be handled and disposed of in accordance with the *National Code of Practice for the Safe Use of Synthetic Mineral Fibres*.
• Where required, any materials classified as Hazardous Waste would be treated, or an immobilisation approval obtained, in accordance with Part 10 of the *Protection of the Environment Operations (Waste) Regulation 2014* prior to off-site disposal.

**Operation**

No mitigation measures are required.

### 7.11 Cumulative impacts

#### 7.11.1 Existing or potential projects

A search of the Department of Planning and Environment website was undertaken on 27 July for major projects located within the Parramatta and Holroyd LGAs. There were no current applications for major project developments in the vicinity of the proposal site.

A search of the development application tracking database for Parramatta and Holroyd councils was undertaken on 21 and 27 July 2015. Applications in the study area relate mainly to residential modifications located to the south of the proposal site and commercial operations along Parramatta Road.

#### 7.11.2 Impact assessment

No major applications for development in close proximity to the proposal site have been lodged. Construction of a number of smaller scale projects may occur in the local area, however the cumulative impacts of the proposal and such small scale projects are expected to be relatively minor and manageable with the implementation of mitigation measures outlined in sections 7.5.3 and 7.11.3.
7.11.3 Mitigation measures

No mitigation measures are required.
8. Environmental management and mitigation

This section provides an outline of the environmental management requirements for the proposal, and a consolidated list of mitigation measures that form the environmental management framework.

8.1 Environmental management plans

8.1.1 Construction

Transport for NSW’s ISO 14001 accredited Environmental Management System (EMS) would be used to manage the proposal. The management system would provide the framework for implementing the environmental management measures documented in this REF, and any conditions of other approvals, licences or permits.

A CEMP would be prepared for the proposal. The CEMP would provide a centralised mechanism through which all potential environmental impacts would be managed. The CEMP would document mechanisms for achieving compliance with the commitments made in this REF, the conditions of approval and other relevant statutory approvals. The plan would address (at a minimum) the following elements:

- water and soil management
- noise and vibration management
- air quality management
- traffic and transport management
- heritage management
- waste management
- community and stakeholder communication.

The plan would be prepared by the contractor/s for the proposal and would be reviewed and endorsed by Transport for NSW prior to the commencement of construction. Implementation and compliance with the CEMP would be monitored by Transport for NSW for the duration of construction. One of the minimum requirements in terms of the tender for the contractor/s is that they have an environmental management plan capable of meeting the requirements of ISO 14001.

8.1.2 Operation

For the operational phase, environmental issues and impacts would be managed under Sydney Trains’ existing operational EMS and through the mitigation measures in section 8.2. The substation would also operate in accordance with Sydney Trains’ existing EPL (EPL No. 12208).

8.2 Summary of mitigation measures

The REF has identified a range of environmental impacts with the potential to occur as a result of the proposal. Table 8.1 provides a summary of the measures proposed to mitigate and manage the potential impacts of the proposal.

The measures listed in Table 8.1 may be revised in response to submissions raised during public display of the REF. Transport for NSW would consider the final environmental
management commitments when making a determination on the proposal. Following determination, the finalised mitigation measures would guide subsequent phases of the proposal. Any contractor/s selected to undertake work would be required to undertake all works in accordance with these measures, the conditions of approval and any other relevant statutory approvals.

Environmental management measures to be implemented during the proposal are listed in Table 8.1. These measures have been consolidated from those included in section 7 of the REF.

<table>
<thead>
<tr>
<th>Issue</th>
<th>ID number</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction</strong></td>
<td></td>
<td>A soils and water quality sub-plan would be prepared as part of the CEMP. It would include the following measures:</td>
</tr>
<tr>
<td>Soils and water quality – general erosion and water management</td>
<td>A.1</td>
<td>• Spoil and groundwater management and disposal requirements based on the findings of the geotechnical and contamination investigation report (GHD, 2015).</td>
</tr>
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<td></td>
<td>• An erosion and sedimentation (the E&amp;S Control Plan), which would be maintained and updated as required to ensure it is representative of the actual site works at any one time.</td>
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<td></td>
<td>• Sediment and erosion control devices (as per the E&amp;S Control Plan) to minimise transport of sediment and materials in accordance with <em>Managing Urban Stormwater: Soils and Construction</em> (Landcom, 2004). These devices would be inspected regularly and immediately after rainfall to ensure effectiveness over the duration of works. Any damage to erosion and sediment controls would be rectified immediately.</td>
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<td></td>
<td>• Control measures are to be documented in the E&amp;S Control Plan for the management and control of sediment tracking onto the local road network.</td>
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<td></td>
<td>• Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and any subsequent records retained. Sediment would be cleared from behind barriers/sand bags on a regular basis as required and all controls would be managed to ensure they work effectively at all times.</td>
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<td>• Any soils excavated that are to be used as backfill would be appropriately stored until required.</td>
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<td>• Disturbed areas would be restored at the completion of works.</td>
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<td>• Spill kits would be maintained on-site at all times.</td>
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<td>• Machinery would be checked daily to ensure that no oil, fuel or other liquids are leaking as part of site pre starts.</td>
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<td>• A refuelling procedure for site plant and equipment in accordance with Transport for NSW’s <em>Chemical Storage and Spill Response Guidelines</em> (2015).</td>
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<td></td>
<td>• All water discharges would be undertaken in accordance with Transport for NSW’s <em>Water Discharge and Re-use Guideline</em> (2012).</td>
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<td>• The existing drainage systems would remain operational during construction.</td>
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<td>• Clean water would be diverted around the worksite in accordance with <em>Managing Urban Stormwater: Soils and Construction</em> (Landcom, 2004).</td>
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<td></td>
<td>A.2</td>
<td>If dewatering is required during construction, the water would be tested (and treated if necessary) prior to re-use, discharge or disposal in accordance with Transport for NSW’s <em>Water Discharge and Re-use Guideline</em> (2012).</td>
</tr>
<tr>
<td>Soils and water quality – management of contaminated soils</td>
<td>A.3</td>
<td>A Detailed Site Investigation would be undertaken to confirm the nature and extent of contamination within the site for the proposed substation; specific requirements for further investigation and remediation; and/or management requirements of any contamination. Recommendations from the Detailed Site Investigation would be incorporated into a Remediation Action Plan (RAP) if required, to be implemented during construction.</td>
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<tr>
<td>Issue</td>
<td>ID number</td>
<td>Mitigation measure</td>
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| A.4   |           | The Detailed Site Investigation and RAP (if required) would be prepared in consultation with Transport for NSW and would be undertaken in accordance with applicable guidelines, including but not limited to:  
- National Environment Protection (Assessment of Site Contamination) Amendment Measure (NEPM) 2013  
- Guidelines for Consultants Reporting on Contaminated Sites (DECCW, 2011)  
- AS4482 Guide to investigation and sampling of site with potentially contaminated soil (2005)  
| A.5   |           | If required, the RAP would identify measures to be implemented to ensure that the contamination is appropriately managed in accordance with relevant legislation and guidelines listed above. |
| A.6   |           | Where required, any materials classified as Hazardous Waste would be treated, or an immobilisation approval obtained, in accordance with Part 10 of the Protection of the Environment Operations (Waste) Regulation 2014 prior to off-site disposal. |
| A.7   |           | An ‘unexpected finds protocol’ would be prepared and included in the CEMP to assist with the identification, assessment, management, health and safety implications, remediation and/or disposal (at an appropriately licenced facility) of any potentially contaminated soil and/or water. |
| A.8   |           | In the event that indicators of contamination are encountered during construction (such as odours or visually contaminated materials), work in the area would cease until an appropriately qualified person can advise on the need for further investigation, remediation or other action. |

**Flora and fauna**

| B.1   |           | Access to the site and the extent of vegetation clearing would be restricted to the access driveway (as shown in Figure 5.1 and Figure 7.1). |
| B.2   |           | The CEMP and construction plans would clearly document the location and full extent of the vegetation disturbance required. These areas would be clearly marked to avoid disturbance to adjacent retained vegetation, and exclusion fencing would be installed around trees to be retained. |
| B.3   |           | The trees proposed for removal would be replaced and/or offset in accordance with Transport for NSW’s Vegetation Offset Guide unless otherwise agreed with or directed by Transport for NSW. |
| B.4   |           | Approval would be obtained in accordance with Transport for NSW’s Application for Removal or Trimming of Vegetation for the trimming, cutting, pruning or removal of trees or vegetation where the impact has not been identified in this REF. |
| B.5   |           | Consultation with Parramatta City Council would be undertaken and any necessary approvals obtained prior the removal of trees 5 and 7. |
| B.6   |           | A vegetation management sub-plan would be prepared as part of the CEMP. It would include the following measures:  
- The management of trees that are being retained would be consistent with the Australian Standard AS4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).  
- Tree removal, maintenance and protection work would be undertaken by a qualified arborist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of five years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works. |
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<th>Issue</th>
<th>ID number</th>
<th>Mitigation measure</th>
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</table>
| B.6 cont. | | • The following activities would be excluded from the tree protection zones of retained trees:  
  – storage of materials, plants or equipment  
  – installation of site sheds or portable toilets  
  – excavations, trenching, ripping or cultivation of soils  
  – modification of existing soil level or addition of fill materials  
  – disposal of waste materials and chemicals (both solid or liquid)  
  – mechanical removal of vegetation  
  – pedestrian or vehicular movement.  
• Tree protection zones and associated controls, storage and movement restrictions would be implemented for trees 4, 8, and 17 as outlined in Appendix C.  
• A protective fence would be installed maintained between the proposal site and trees 9 to 16.  
• Tree 13 would be retained and protected.  
• If works are required within the tree protection zones, they would be restricted to the area outside of the structural root zone to avoid disturbing the stability and health of the trees.  
• Any root pruning required within the structural root zone would be approved and conducted by the project arborist. Any digging and pruning of roots within the structural root zone would be conducted by hand for a clean cut. Only roots with a diameter of less than five centimetres would be pruned.  
• Once construction is complete, retained trees would be re-inspected by the project arborist and where necessary, remedial work (as outlined in Appendix C) would be undertaken to reduce the risk to people and property. |
| B.7 | | Any vegetation planted on-site would consist of locally endemic native species, unless otherwise agreed with Transport for NSW, following consultation with Parramatta City Council where relevant, and/or Sydney Trains. |
| B.8 | | Weed control mitigation and management strategies would be documented and implemented in accordance with the Noxious Weeds Act 1993. This would include procedures to reduce the spread of weeds via vehicles and machinery, such as visual inspection of vehicles prior to exit from site to ensure they are clear of plant material. |
| B.9 | | Weeds would be managed and disposed of in accordance with the requirements of the Noxious Weeds Act 1993 and/or the Weeds of National Significance Weed Management Guide. |
| Noise and vibration | C.1 | Mitigation measures documented in Construction Noise Strategy (Transport for NSW, 2012) would be adopted where feasible and reasonable, as specified in Tables 6-1 and 6-2 of Appendix D. |
| | C.2 | A noise and vibration management plan would be prepared as part of the CEMP in accordance with the Construction Noise Strategy (Transport for NSW, 2012) and the Interim Construction Noise Guideline (DECC, 2009). It would include the following measures:  
  • Sensitive receivers would be identified and marked on plans.  
  • Works would be scheduled during recommended standard hours where practicable.  
  • All equipment and construction methodologies would be selected to minimise noise emissions. Equipment would be fitted with appropriate silencers and be in good working order. Machines found to produce excessive noise compared to normal industry expectations would be removed from the site or stood down until repairs or modifications can be made. |
C.2 cont

- All site workers would be educated as to the potential for noise impacts on sensitive receivers and land uses and encouraged to take practical and reasonable measures to minimise impact during the course of their activities. This would include:
  - toolbox talks covering avoiding the use of outdoor radios during the night period
  - avoiding shouting and slamming doors
  - where practicable, machines would be operated at low speed or power and switched off when not being used, rather than left idling for prolonged periods
  - avoiding dropping materials from height and metal to metal contact where practicable.
- Truck drivers would be informed of designated vehicle routes, parking locations and the requirement to minimise engine idling.
- Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on construction vehicles and mobile plant regularly used on-site and for any out of hours work.
- Where noise and vibration levels during the works are predicted to exceed acceptable levels after implementation of general work practices, the additional mitigation measures included in Table 6-1 and 6-2 of Appendix D would be implemented where reasonable and feasible.
- Nearby receivers would be notified of the works prior to commencement. Notification would include expected noise levels, duration of the works and a method of contact (Transport for NSW’s 1800 775 465 number).
- A process for complaints management as outlined in section 6.4.1.

C.3

If out of hours works are required, the contractor would prepare and submit a Transport for NSW Out of Hours Work Assessment (3TP-PR-065) and Application Form (9TP-FT-079) for approval prior to the works being undertaken. All out of hour works and activities outside the recommended standard hours are to be undertaken with additional mitigation measures in accordance with the Construction Noise Strategy (Transport for NSW, 2012).

C.4

Where construction is required within the safe working buffer distance, alternative work methods such as smaller equipment should be considered. If no alternative work method is feasible or reasonable then compliance vibration monitoring should be undertaken where works are required within the safe working buffer distances and include:
- Site tests to review the measured frequency content to determine the structural damage criteria as per Table 3-6 and Table 3-7 of the Noise and Vibration assessment (Appendix D) for standard dwelling and for heritage structures respectively.
- Continuous vibration monitoring with a visual alarm installed to warn the equipment operator when the structural damage vibration criteria (considering frequency content) is exceeded.

Air quality

D.1

An air quality management sub-plan would be prepared as part of the CEMP. It would include the following measures:
- All plant and machinery would be fitted with emission control devices complying with the Australian Design Standards.
- Machinery would be turned off when not in use and not left to idle for prolonged periods.
- Vehicle movements would be limited to designated entries and exits, haulage routes (to be determined during preparation of the traffic management plan, and in consultation with Roads and Maritime Services and Council) and parking areas.
- Dust generation would be monitored visually, and where required, dust control measures such as water spraying would be implemented to control the generation of dust.
- Any waste produced on-site would be stored and stockpiled for removal off-site daily, to reduce the production of dust.
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<th>Issue</th>
<th>ID number</th>
<th>Mitigation measure</th>
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| D.1 cont. | | • Materials transported to and from the site would be covered to reduce dust generation in transit.  
• Access points would be inspected to determine whether sediment is being transferred to the surrounding road network. If required, sediment would be promptly removed from roads to minimise dust generation.  
• Stabilising any excavated areas as soon as practicable.  
• Stockpile management would be undertaken in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).  
• Material stockpiles awaiting removal from site that are inactive for a period of greater than one week would be stabilised (seeded or covered).  
• Fixed hoses would be used to dampen exposed surfaces to minimise dust generation, where required.  
• Shade cloth would be fastened to the perimeter fence on the proposal site to minimise dust transported from the site during construction. |
| Traffic and transport | E.1 | A traffic management sub-plan would be prepared as part of the CEMP. It would include the following measures:  
• Traffic and access would be managed in accordance with *Traffic Control at Work Sites* (RTA, 2010) and in consultation with Roads and Maritime Services, Parramatta City Council and Holroyd City Council.  
• Residents, property owners would be notified of any access restrictions in advance of work commencing.  
• Appropriate traffic management controls would be implemented, including precautionary signs, illuminated warning devices, manual and/or electronic traffic control, and the provision of temporary barriers and markers, to control pedestrians and traffic access to and around the proposal site. |
| E.2 | | • Safe access points to the proposal site would be established, including safety measures such as security fencing and/or barriers, maintaining sight distance requirements, signage and the provision of traffic management measures.  
• Detail of the required approvals and permits (Council and RMS) required to be obtained prior to works, including any approvals associated with temporary lane closures and / or speed reduction zones.  
• The requirements of the *Roads Act 1993* would be followed at all times prior to and during all work (including notice requirements, consultation and consent/concurrence requirements for work within public and classified roads).  
• Heavy vehicles would be restricted to the specified routes.  
• Oversized deliveries would be undertaken in accordance with the requirements of Council, Roads and Maritime Services and NSW Police. |
| E.3 | | In consultation with Parramatta City Council, consideration would be given to implementing eight tonne load restrictions on the local roads connecting with Railway Parade, including Jamieson Street, The Avenue, Smith Street, Margaret Street and Milton Street. |
| Land use and socio-economic issues | F.1 | The CEMP would specify the approach to consultation during construction, the communication tools to be used, and response protocols. Specific consultation tasks to be undertaken include:  
• Advising affected landholders of the proposal, the construction hours and duration of work, and supplying a contact number for any queries relating to the work.  
• Displaying accurate public information signs while work is in progress and until site restoration has been completed. |
<p>| Visual amenity | G.1 | Shade cloth or similar material would be attached to the site fencing to minimise views of the worksite. |
| G.2 | | The worksite would be left in a tidy manner at the end of each work day. |</p>
<table>
<thead>
<tr>
<th>Issue</th>
<th>ID number</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heritage</td>
<td>H.1</td>
<td>All heritage items in the immediate vicinity of the proposal site would be marked on site plans, and avoided.</td>
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<tr>
<td></td>
<td>H.2</td>
<td>A heritage induction would be provided to all workers before construction commences informing them of the location of heritage items within the study area and guidelines to follow if unanticipated heritage items or deposits are located during construction.</td>
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<td>H.3</td>
<td>If previously unidentified indigenous or non-indigenous heritage/archaeological items are uncovered during construction works, all works in the vicinity of the find shall cease and the Transport for NSW Project Manager and Environmental Planning Manager (EPM) notified. Appropriate advice shall be sought from a suitably qualified heritage consultant/archaeologist (and in consultation with the relevant division of OEH, as required). Works in the vicinity of the find shall not re-commence until clearance has been received from the heritage consultant/archaeologist and the Transport for NSW EPM.</td>
</tr>
<tr>
<td>Waste and hazardous</td>
<td>I.1</td>
<td>Wastes generated by the proposal would be managed in accordance with the Waste Classification Guidelines (EPA, 2014) and in accordance with the waste minimisation hierarchy as follows:</td>
</tr>
<tr>
<td>materials</td>
<td></td>
<td>• avoidance, where possible</td>
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<tr>
<td></td>
<td></td>
<td>• treated, as required and reused on-site</td>
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<td>• recycled, either within the process or off-site</td>
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<td>• where other alternatives are not possible, wastes would be disposed of at appropriately licensed waste management facilities.</td>
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<td>I.2</td>
<td>A hazardous materials management plan would be prepared as part of the CEMP. It would include the following measures:</td>
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<tr>
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<td>• The removal, handling and disposal of any asbestos waste would be undertaken by an appropriately licensed contractor, and in accordance with:</td>
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<td>- Code of Practice for the Safe Removal of Asbestos 2005</td>
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<td>• An occupational hygienist would be responsible for conducting asbestos fibre air monitoring, visual clearance inspections and issuing clearance certificates after the completion of any removal works.</td>
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<td></td>
<td>• Work would cease in the vicinity of any potential asbestos materials which have not been previously identified. The material would be analysed for the presence of asbestos. In the event the material is disturbed prior to work ceasing, the provisions of an Asbestos Removal Control Plan or similar would be followed, including seeking advice from a suitably qualified and experienced professional.</td>
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<td>• Lead dust would be removed from the substation building by a qualified hazardous material removal contractor and should be subject to ongoing monitoring and inspections by an Occupational Hygienist to ensure compliance with the relevant legislation and Australian Standards.</td>
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<td></td>
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<td>• All known and presumed occurrences of polychlorinated biphenyl’s would be handled and disposed of in accordance with the procedure documented within ANZECC Identification of PCB-containing Capacitors – An information booklet for electricians and electrical contractors 1997. Removal would be undertaken by a suitable licenced hazardous material removal contractor and would be disposed of to a suitably licenced facility.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In the event synthetic material fibres are found on site, they would be handled and disposed of in accordance with the National Code of Practice for the Safe Use of Synthetic Mineral Fibres.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Where required, any materials classified as Hazardous Waste would be treated, or an immobilisation approval obtained, in accordance with Part 10 of the Protection of the Environment Operations (Waste) Regulation 2014 prior to off-site disposal.</td>
</tr>
<tr>
<td>Issue</td>
<td>ID number</td>
<td>Mitigation measure</td>
</tr>
<tr>
<td>---------------------------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise and vibration</td>
<td>J.1</td>
<td>Transformers, rectifiers and other electrical equipment on site would be well maintained and operated according to specifications.</td>
</tr>
<tr>
<td></td>
<td>J.2</td>
<td>Operational noise monitoring would be undertaken at regular periods to assess compliance against operational noise criteria.</td>
</tr>
<tr>
<td></td>
<td>J.3</td>
<td>If the results of monitoring indicate that operational noise levels are significantly higher than those modelled for the REF, the use of mufflers or other acoustic treatment methods would be investigated.</td>
</tr>
<tr>
<td></td>
<td>J.4</td>
<td>Maintenance operations would be scheduled during the day.</td>
</tr>
<tr>
<td></td>
<td>J.5</td>
<td>Any noise complaints would be managed in accordance with the process for complaints management outlined in section 6.4.1.</td>
</tr>
<tr>
<td>Air quality</td>
<td>K.1</td>
<td>Switchgear and management of SF6 would be maintained in accordance with standard management procedures.</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>L.1</td>
<td>The detailed design of the proposal would take into account relevant urban design and visual considerations.</td>
</tr>
<tr>
<td>Electromagnetic energy</td>
<td>M.1</td>
<td>During detailed design and commissioning of the substation, detailed analysis and monitoring would be undertaken to determine the electromagnetic energy levels within and outside the substation. Should exceedances of the criteria be found, methods to reduce these exceedances would be implemented.</td>
</tr>
<tr>
<td></td>
<td>M.2</td>
<td>The risk of interference to MF band (500 kHz to 3 MHz) radio or communications receiver equipment within 30 metres of the 600 volt cabling would be mitigated by increasing the distance separation between the cabling and the rail track, or by installation of magnetic shielding. This would be determined during detailed design.</td>
</tr>
</tbody>
</table>
9. Conclusion

This section provides a conclusion to the REF, including a summary of the proposal justification and the findings of the REF.

This REF considers the potential impacts of the proposal to construct a new substation at Granville. It has been prepared by GHD on behalf of Transport for NSW to assist with determination of the proposal under Part 5 of the EP&A Act.

9.1 Justification of the proposal

The proposal forms part of Transport for NSW’s Power Supply Upgrade Program, which is being undertaken to meet the actual and projected increase in power demands on the Sydney Trains electrical network. The power supply study undertaken for the network identified that a new substation was required in the Granville area to provide additional capacity and improve reliability for the operation of trains along the North Shore, Northern and Western Line, and the Airport, Inner West and South Line. This would allow for the decommissioning of the existing Granville Substation, which has reached the end of its operational life.

The construction of Granville Junction Substation would increase the capacity of the power supply network in the area. Without this increase in power supply, the rail network would not have sufficient capacity to meet the power supply needs of the increase in the number of trains, and the increase in the number of air-conditioned trains.

9.2 Summary of REF findings

The REF has considered the potential impacts of the proposal. It has been prepared in accordance with Part 5 of the EP&A Act, and in particular, the requirements of section 111 of the Act, and clause 228 of the Regulation. The REF has documented the potential environmental impacts of the proposal, considering both potential positive and negative impacts, and recommending management and mitigation measures to protect the environment where required.

9.2.1 Clause 228 considerations

Clause 228 of the Regulation specifies the matters that must be taken into account, for the purposes of Part 5 of the Act, when consideration is being given to the likely impact of an activity on the environment. The potential impacts of the proposal have been considered in sections 7.1 to 7.11 of the REF. The Clause 228 matters and how they relate to the proposal are considered in Appendix A.

9.2.2 Ecologically sustainable development

Transport for NSW is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of sustainable development. These principles would be incorporated into the management systems for the proposal.

Appendix A summarises how the principles of ecologically sustainable development adopted by the EP&A Act have been addressed by the REF process.

A sustainability assessment of the proposal against the *NSW Sustainable Design Guidelines* (Transport for NSW, 2013) was undertaken as outlined in section 5.5.
9.2.3 Significance of impacts

Whilst some potentially negative impacts may result from the proposal, these impacts would be short-term and localised and are not considered to be significant. Section 8.2 of the REF provides the mitigation measures that would be implemented to reduce the potential for impacts and manage the environmental performance of the proposal.

9.3 Conclusion

The REF identifies that the proposal would have the potential for both positive and negative impacts, and it identifies mitigation measures to reduce or manage the negative impacts.

Environmental investigations were undertaken during preparation of the REF to assess the potential environmental impacts.

There are considered to be no significant environmental issues associated with the proposal. In the short-term, there may be minor adverse impacts associated with construction. Key issues identified include:

- potential short-term noise impacts during construction
- temporary loss of about four on-street parking spaces
- removal of three trees for the new site access
- management of potential hazardous materials.

Operational impacts include:

- the presence of a new structure in the landscape, which would be visible to passing traffic and pedestrians, and from some residences opposite the site on Railway Parade
- loss of two on-street parking spaces on Railway Parade.

Any potential adverse impacts resulting from the proposal are considered manageable through the implementation of mitigation measures in section 8.2.

In conclusion, the proposal is needed so that the power supply for the rail network has sufficient capacity for future increases in the number of services and also the type of rolling stock. It is considered that the adverse environmental impacts would be generally short-term and localised in nature. With the adoption and implementation of the proposed mitigation and management measures listed in section 8.2 the potential environmental impacts of the proposal would be adequately mitigated and managed, and are not considered to be significant.
10. References


British Standards, 2009, *Code of practice for noise and vibration control on construction and open sites, BS 5228-1*


Department of Environment and Conservation (DEC), 2006, *Assessing vibration – A technical guideline*

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

Department of Environment, Climate Change and Water (DECCW), 2011, *Road Noise Policy*


Environment Protection Authority (EPA), 2000, *Industrial Noise Policy*

Environment Protection Authority (EPA), 2014, *Waste Classification Guidelines*


James, T., McDougall, L and Benson, D., 1999, *Rare Bushland Plants of Western Sydney*, Sydney


Transport for NSW, 2015, *Chemical Storage and Spill Response Guidelines*

UrbanGrowth NSW, 2015, *New Parramatta Road, Draft Parramatta Road Urban Renewal Strategy*
Appendices
## Appendix A – Clause 228 factors and ecologically sustainable development considerations under the EP&A Act

### Table A.1 Clause 228 considerations

<table>
<thead>
<tr>
<th>Clause 228 factor</th>
<th>Summary of results</th>
<th>Potential impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Any environmental impact on a community</td>
<td>The proposal has the potential to result in amenity related impacts in the vicinity of the works. These impacts would be managed through the implementation of the proposal environmental management plan. No long-term environmental impacts are predicted.</td>
<td>Short-term – minor negative Long-term – none</td>
</tr>
<tr>
<td>(b) Any transformation of a locality</td>
<td>The proposal would be located adjacent to rail infrastructure zoned land which adjoins the road network. It would not result in the transformation of this locality.</td>
<td>None</td>
</tr>
<tr>
<td>(c) Any environmental impact on the ecosystems of the locality</td>
<td>The proposal would require the removal of three trees. No environmental impact on the ecosystems is anticipated.</td>
<td>Minor</td>
</tr>
<tr>
<td>(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality</td>
<td>The proposal would require the removal of three trees.</td>
<td>Minor</td>
</tr>
<tr>
<td>(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value</td>
<td>The proposal would not result in any impact on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value.</td>
<td>None</td>
</tr>
<tr>
<td>(f) Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)</td>
<td>No impacts on protected fauna within the meaning of the National Parks and Wildlife Act 1974 are predicted.</td>
<td>None</td>
</tr>
<tr>
<td>(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air</td>
<td>The proposal would not endanger any species of plant, animal or other form of life.</td>
<td>None</td>
</tr>
<tr>
<td>(h) Any long-term effects on the environment</td>
<td>Other than the introduction of a new structure in the landscape, the proposal would not to have any long-term impacts on the environment.</td>
<td>None</td>
</tr>
<tr>
<td>(i) Any degradation of the quality of the environment</td>
<td>The proposal has the potential to result in minor impacts to environmental quality during the construction period. These impacts would be managed through the implementation of mitigation measures. No long-term impacts to the quality of the environment are predicted.</td>
<td>Short-term - minor negative Long-term - none</td>
</tr>
<tr>
<td>(j) Any risk to the safety of the environment</td>
<td>The construction of the proposal is not considered to result in any risk to the safety of the environment. Safety in the vicinity of the proposal would be managed by the contractor/s.</td>
<td>None</td>
</tr>
<tr>
<td>(k) Any reduction in the</td>
<td>The proposal would not result in any reduction in the range.</td>
<td>None</td>
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</table>
Table D.2 ESD considerations under the EP&A Act

<table>
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<tr>
<th>Principle</th>
<th>Definition</th>
<th>Comment</th>
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<tr>
<td>Precautionary principle</td>
<td>This principle states that ‘if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation’.</td>
<td>A range of environmental assessments have been undertaken during the preparation of this REF to ensure that the potential environmental impacts can be understood with a high degree of certainty. There are not considered to be any threats of serious or irreversible environmental damage. The proposal has evolved to avoid environmental impact where possible and mitigation measures would be implemented to minimise impacts. No mitigation measures have been deferred due to a lack of scientific certainty. The proposal is therefore considered to be consistent with the precautionary principle.</td>
</tr>
<tr>
<td>Intergenerational equity</td>
<td>The principle states, ‘the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations’. In other words, we should ensure that future generations do not inherit a degraded environment.</td>
<td>The proposal site has been previously disturbed during previous uses, and development of the rail corridor. The proposal would not result in any impacts that are likely to impact on the health, diversity or productivity of the environment for future generations. The proposal would benefit future generations as the increase in power supply would allow more trains services to be introduced on to the network which would improve public transport.</td>
</tr>
<tr>
<td>Conservation of biological diversity and ecological integrity</td>
<td>This principle states that the ‘diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and</td>
<td>The study area is located in a modified urban environment. No potential impacts to biological diversity and ecological integrity were identified.</td>
</tr>
<tr>
<td>Principle</td>
<td>Definition</td>
<td>Comment</td>
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<td>Improved valuation, pricing and incentive mechanisms</td>
<td>improved to ensure their survival’.</td>
<td>The cost of environmental resources includes the costs incurred to protect the environment. The mitigation measures imposed to minimise the adverse impacts of this proposal would result in economic costs to the construction and operation of the proposal. This indicates the valuation of environmental resources has been assigned. The proposal has been designed to minimise adverse impacts on the environment by confining work to a defined area and implementing appropriate mitigation measures when impacts are expected.</td>
</tr>
</tbody>
</table>
Appendix B – Concept design plans
Appendix C – Flora, fauna and arborist assessment
Appendix D – Noise and vibration assessment
Appendix E – Electromagnetic assessment
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<th>Reviewer</th>
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<td>Ben Bracken</td>
<td>A Raleigh, S Pusenjak</td>
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