



Transport  
for NSW



# Power Supply Upgrade Lee Street Substation, Central Review of Environmental Factors

June 2014



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# Glossary of terms

Term	Definition
Central Station site/group	Land that is generally associated with Lot 118 DP 1078271 and contains Central Station and the Sydney Yards (see below). Some other railway uses located outside of this allotment are also included in this site and group.
Circuit breakers	Manually or automatically operated electrical switch designed to protect an electrical circuit from damage caused by overload or short circuit. Its basic function is to detect a fault condition and interrupt current flow.
dB(A)	Decibel expressed with the frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at low and high frequencies.
Feeders	In the context of the Traction Substations project, a feeder is either <ul style="list-style-type: none"> <li>• a 33kV AC cable coming in to the substation from the RailCorp supply or from Ausgrid</li> <li>• a cable supplying 1500V DC from the traction substation to the overhead wiring system.</li> </ul>
$L_{A90(\text{period})}$	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. $L_{A90(15 \text{ min})}$ .
$L_{Aeq(\text{period})}$	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.
Proposal	Refers the construction and operation of the Lee Street Substation.
Proposal site	The immediate location of the proposal, which is the area that has the potential to be directly disturbed by construction.
RailCorp	Former Rail Corporation of NSW, now referred to as Sydney Trains.
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, and including land that has the potential to be indirectly impacted by the proposal.
Sydney Trains	Former Rail Corporation of NSW (RailCorp).
Sydney Central Yards	Refers the rail corridor at Central Station and to the south of the station. This area is similar to the area described as the Central Station site/group.
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 the supply the rail network work with power to power the rollingstock.

# List of abbreviations

Abbreviation	Definition
CBD	Central Business District
CEMP	Construction Environmental Management Plan
DC	Direct current
EME	Electromagnetic energy
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Act 1999</i>
EPL	Environmental Protection Licence
GHD	GHD Pty Ltd
Goods Line	Darling Harbour Goods Line
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
kV	Kilovolts
LGA	Local government area
m	metre
m <sup>2</sup>	Square metres
MW	Megawatt
NSW	New South Wales
POEO Act	<i>Protection of the Environment Operations Act 1997</i>
PSU Program	Power Supply Upgrade Program (formerly TSU program)
REF	Review of Environmental Factors
RMS	Roads and Maritime Services
RTA	Roads and Traffic Authority (now Roads and Maritime Services)
SREP	<i>Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005</i>
Substation	Lee Street Substation
Sydney LEP	<i>Sydney Local Environmental Plan 2012</i>
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSU	Traction Supply Upgrade

# Executive summary

## Overview

This Review of Environmental Factors (REF) considers the potential impacts of the construction and operation of a new traction substation at Lee Street near Central Station. 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*.

### Why is the proposal needed?

Transport for NSW is currently undertaking the Power Supply Upgrade 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 the existing Prince Alfred Substation needs to be replaced.

Transport for NSW is proposing to replace the Prince Alfred Substation with two new substations; one at Lee Street and one at Chalmers Street. The two proposed substations would be located within the heritage listed precinct of Central Station, within or near the rail corridor. This REF assesses the potential impacts of the proposed substation at Lee Street. The proposed substation at Chalmers Street is the subject of a separate environmental assessment and approval process.

### Where would the proposal be located?

The proposal site is located within the suburb of Chippendale, on land owned by Sydney Trains. It is located near Lee Street, just to the north of the State Transit Authority bus layover area, which is located along the western edge of the rail corridor.

The proposal site is approximately 550 m squared in area, with approximate dimensions of 45 m by 20 m. The external walls of the substation building would form the boundary of the majority of the site.

### What would the proposal involve?

The proposal involves the construction of a two storey substation (first floor and cable basement level) over the existing Darling Harbour Goods Line cutting. The new substation would supply traction power to the Sydney Central Yard tracks.

The substation would include an administration office and toilet facilities along with all the required electrical equipment. It would be accessed via a new access from Lee Street, which would be located between the combined access driveway to 26 Lee Street and the Sydney Trains Depot, and the access to the State Transit Authority bus layover area.

### How long would the proposal take to construct?

It is anticipated that construction of the proposal would commence in late 2014, and would take approximately 15 months to construct. The main civil construction activities would be completed within 10 months, while the fit out of the substation would take five months.

## Summary of the findings of the REF

During construction, the proposal could result in the following impacts:

- traffic and access impacts associated with the need for heavy vehicles to access the site, the positioning of cranes and the requirement for some oversized deliveries
- noise due to the operation of machinery and equipment
- potential disturbance of any contaminated fill material associated with the rail corridor
- amenity impacts to the surrounding community.

These construction impacts would be relatively minor and short term, and would be mitigated by the implementation of the mitigation measures.

During operation, the main potential for impact relates to the introduction of a new structure within the curtilage of the State heritage listed Sydney Terminal and Central Railway Stations Group. A Statement of Heritage Impact has been prepared by Rappoport Heritage Consultants to assess the potential impacts of the proposal. The assessment concluded that the proposal would have minimal impact on the Sydney Terminal site and its significant elements, and minimal impact on nearby heritage items. It concluded that, on the whole, the proposal respects, conserves and minimises impact to the heritage significance of the site.

Under Section 57(1) of the *Heritage Act 1977*, approval must be obtained from the Heritage Council for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. As the proposal is not considered to be subject to any of the exemptions to approval under Section 57(2) of the Heritage Act, an application for approval by the Heritage Council will be submitted in accordance with Section 60 of the Act.

Adverse environmental impacts would be minimised by implementing mitigation measures outlined in this REF, including preparing and implementing a construction environmental management plan (CEMP).

## Where to from here?

The REF will be displayed and made publicly available, and the community and stakeholders will be encouraged to make submissions on the proposal and any potential environmental impacts. Following the display period, Transport for NSW will consider the issues raised in submissions. Transport for NSW will then determine whether to proceed with the proposal. If the proposal proceeds, it would be undertaken in accordance with the mitigation measures proposed in this REF and any conditions of approval that form part of the determination.

# 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 the existing Prince Alfred Substation needs to be replaced.

Transport for NSW is proposing to replace the existing Prince Alfred Substation with two new traction substations at Lee Street and Chalmers Street. The two proposed substations would be located within the heritage listed precinct of Central Station, within or near the rail corridor.

The construction and operation of the Lee Street 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). GHD Pty Ltd (GHD) was commissioned by Transport for NSW to undertake an assessment of the potential environmental impacts of the proposal, and prepare a Review of Environmental Factors (REF) in accordance with the EP&A Act.

The construction and operation of the Chalmers Street Substation will be subject to a separate environmental assessment and approval process.

## 1.2 The Power Supply Upgrade Program

The PSU Program was initiated by RailCorp in 2005 to ensure that Sydney's rail network will be capable of meeting the expected power requirements of future train timetables, and the requirements of the new generation of air conditioned trains (for example, Waratah trains). The PSU Program involves constructing new electrical infrastructure and upgrading substations, section huts, overhead wiring and 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.

The delivery of the PSU Program was transferred to Transport for NSW in 2012.

## 1.3 The proposal

The proposal involves the construction and operation of a new two storey substation across the existing Darling Harbour Goods Line (the Goods Line) near Lee Street, to the west of Central Station. The location of the proposal is shown in Figure 1.1. The new substation would supply traction power to the Sydney Central Yard tracks.

The substation would include electrical equipment, together with office and toilet facilities. It would be accessed via a new access from Lee Street, located between the combined access driveway to 26 Lee Street and the Sydney Trains Depot, and the access to the State Transit Authority bus layover area.

A description of the proposal is provided in section 5.

## 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**

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

## 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:

1. 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).
2. 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.
3. 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.

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

- The 'proposal' refers to the construction and operation of the Lee Street Substation.
- The 'substation' refers to the Lee Street Substation.
- The 'proposal site' is defined as the immediate location of the proposal, which is the area that has the potential to be directly disturbed by construction. The proposal site is shown in Figure 1.1.
- 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.

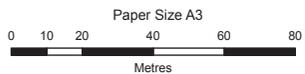
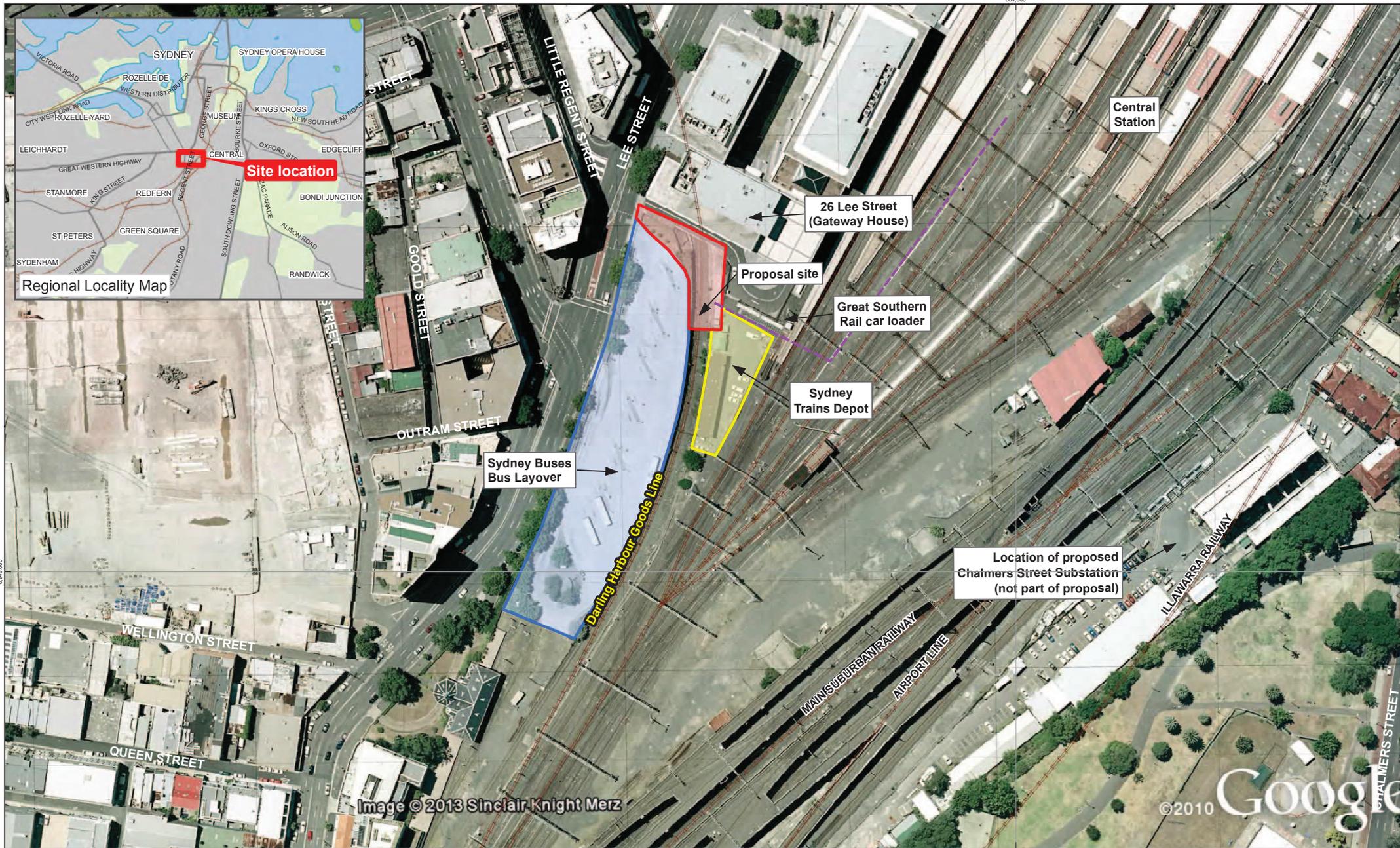
### **1.5.2 Methodology**

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. Preparing the REF has involved the following tasks:

- attending a project inception meeting/briefing
- receiving relevant information from Transport for NSW
- a site visit
- consultation and liaison with key stakeholders
- undertaking specialist impact assessments as an input to the REF:
  - Noise and Vibration Assessment (undertaken by GHD)
  - Statement of Heritage Impact (undertaken by Rappoport Heritage Consultants)
  - Electromagnetic Fields Assessment (undertaken by EMC Services)
  - Limited Contaminated Land Assessment (undertaken by GHD)
- reviewing specialist assessments being undertaken as part of the design process, and incorporating relevant information in the REF, including the geotechnical and contamination assessments
- a qualitative desktop assessment of other potential 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.

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.



**LEGEND**

- Proposal site
- Sydney Trains Depot
- Sydney Buses Bus Layover
- Heavy Rail
- Proposed negative cable route



Transport NSW  
REF- Lee St Substation

Job Number | 21-22993  
Revision | 0  
Date | 30 May 2014

Location of the proposal **Figure 1.1**

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## 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

#### 2.1.1 Location

The proposal site, which is shown in Figure 1.1, is located within the suburb of Chippendale, in the City of Sydney local government area (LGA). The site is identified as Lot 118 DP 1078271, which encompasses Central Station and other railway infrastructure located near Central Station. The land is owned by Sydney Trains.

The site is located near Lee Street, just to the north of the State Transit Authority bus layover area, which is located along the western edge of the rail corridor.

#### 2.1.2 Description of the site

The proposal site would be approximately 550 m in area, with approximate dimensions of 45 m by 20 m. The external walls of the substation building would form the boundary of the majority of the site.

The eastern component of the proposal site would be positioned above the cutting that leads into the Goods Line tunnel. The base of the new substation would form an extension of the Goods Line Tunnel in a southerly direction. Although the Goods Line is not currently in use, it is considered for the purposes of the proposal design to be a future operational rail line and part of the rail corridor. Figure 2.1 shows the area in which the proposal would be located above the Goods Line cutting. This track is a single bidirectional track which provides a link between the Sydney Central Yards (near Central) to Darling Harbour. A sandstone retaining wall (with heritage significance – refer section 7.1) is located along the eastern side of the cutting.

The western component of the proposal site would be located on a small piece of open space (shown in Figure 2.2) which is located adjacent to Lee Street. This part of the proposal site is located between the State Transit Authority bus layover area and the access road to the Sydney Trains Depot on the eastern side of the Goods Line, and the office building at 26 Lee Street (Gateway House). The proposal would also potentially include some service relocation works within the Lee Street road reserve (both footpath and roadway), subject to future design development.

The proposal site would not encroach on the bus layover area. A retaining wall and associated iron fence with heritage significance is located along the western side of the cutting.

### 2.2 The study area and site context

The proposal site is located at the southern end of Sydney's central business district (CBD). Land to the east of the site is dominated by railway uses associated with Central Station, while land to the west of the site generally consists of a mixture of commercial and residential uses.

Land directly to the south of the site is managed by the State Transit Authority for use as a bus layover area, which provides parking for approximately 25 buses. This layover area is accessed via a driveway located directly to the south of the proposal site. Vehicles exit the site to Lee Street further to the south (opposite Regent Street).

The western side of Lee Street consists of a mix of residential apartment buildings, hotels/hostels, and commercial office buildings. Land to the north of the site consists mainly of

commercial office buildings around Henry Deane Place. A vehicle access road located to the south of these buildings provides access to a car park located beneath these buildings. This access road also provides access to a Sydney Trains Depot, which is located between the Goods Line and the Sydney Yards (to the east of the proposal site).

The Main West Line rail corridor is located to the east of the Sydney Trains Depot. It consists of the operational tracks which provide access to the intercity platforms located on the western side of Central Station.

The Great Southern Rail car loader is also located to the east of the proposal site, to the north of the Sydney Trains Depot and adjacent to Platform 1 at Central Station. This facility is used twice a week.

The key features of the study area are shown on Figure 1.1.



**Figure 2.1 Area above the Darling Harbour Goods Line where the eastern portion of the proposal site would be located**



**Figure 2.2 Area of open space where the western portion of the proposal site would be located**

## 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 accordance 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.

In addition, clause 79(2) of the Infrastructure SEPP permits the alteration, demolition and relocation of local heritage items, and the alteration or relocation of State heritage items for the purpose of rail infrastructure facilities, without the need for development 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 the Council of the City of Sydney (Council) 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.

## **Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005**

Regional environmental plans are deemed to be SEPPs. The proposal is located within the Sydney Harbour Catchment area as identified by the *Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005* (the SREP). However, there are no specific provisions relevant to the proposal or proposal site as it is not located within any of the areas listed by clause 3(2). The proposal is considered to be consistent with the aims of the SREP.

### **3.2.2 Local environmental plans**

The *Sydney Local Environmental Plan 2012* (the Sydney LEP) applies to land within the City of Sydney LGA. The proposal site is located within land which is zoned SP2 Infrastructure (Railways). The zone provisions provide that the proposal would be permitted with consent.

Clause 5.12 of the LEP 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 Sydney LEP do not apply to the proposal.

## **3.3 Other legislative considerations**

Other environmental legislation that is relevant to the approval and/or assessment of the proposal is considered below.

### **3.3.1 NSW legislation**

#### **Heritage Act 1977**

The *Heritage Act 1977* identifies and protects heritage items in NSW. Under the Heritage Act it is an offence to disturb an item of heritage significance without consent. Under Section 57(1) of the *Heritage Act 1977*, approval must be obtained from the Heritage Council for works to a place, building, work, relic, moveable object, precinct, or land listed on the State Heritage Register. Under section 139, an excavation permit is required to disturb or excavate any land containing or likely to contain a relic.

The proposal is located within the curtilage of the Sydney Terminal and Central Railway Stations Group, which is listed on the State Heritage Register. A Statement of Heritage Impact has been prepared by Rappoport Heritage Consultants to assess the potential impacts of the proposal. The assessment concluded that the proposal would have minimal impact on the Sydney Terminal site and its significant elements, and minimal impact on nearby heritage items. It concluded that, on the whole, the proposal respects, conserves and minimises impact to the heritage significance of the site.

As the proposal is not considered to be subject to any of the exemptions to approval under Section 57(2) of the Heritage Act, an application for approval by the Heritage Council will be submitted in accordance with Section 60 of the Act.

Further information is provided in section 7.1.

#### **Roads Act 1993**

Under section 138, Part 9, Division 3 of the *Roads Act 1993*, a person must not impact or carry out work on or over a public road otherwise than with the consent of the appropriate roads authority. In accordance with clause 5 of Schedule 2, public authorities are not required to obtain approval for works on unclassified roads.

The proposal would involve the construction of a new access driveway to Lee Street, which is a classified road (Main Road 170). Therefore, consent is required from NSW Roads and Maritime Services under section 138 of the Roads Act 1993.

#### **National Parks and Wildlife Act 1974**

The *National Parks and Wildlife Act 1974* provides the basis for legal protection and management of Aboriginal sites and objects in NSW. Under Section 87 of the Act a heritage impact permit is required to harm or desecrate an Aboriginal heritage object.

A search of the Aboriginal Heritage Information Management System database was undertaken. The results of the search indicated that there are no recorded items located in or in the immediate vicinity of the proposal site. Furthermore, the proposal is unlikely to have an impact on unknown items of Aboriginal heritage significance and a heritage impact permit is not required.

#### **Protection of the Environment Operations Act 1997**

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes, amongst other things, the procedures for issuing of licences for environmental protection on aspects such as waste, air, water and noise pollution control. An environment protection licence (EPL) is generally issued for scheduled activities or scheduled development work. 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.

#### **Water Management Act 2000 and Water Act 1912**

The *Water Management Act 2000* and *Water Act 1912* control the extraction of water, the use of water, the construction of works such as dams and weirs and the carrying out of activities in or near water sources in NSW. The provisions of the Water Management Act are being progressively implemented to replace the Water Act. Since 1 July 2004 the new licensing and approvals system has been in effect in those areas of NSW covered by operational water sharing plans.

Excavation work would be undertaken as part of the proposal, and it is possible that groundwater would be intercepted. Under both the Water Management Act and the Water Act a licence is required for dewatering and interception of groundwater. However, subject to confirmation with the Office of 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.

Further information on the potential for soil, water quality and groundwater impacts is provided in Section 7.2.

### 3.3.2 Commonwealth legislation

#### Commonwealth Environment Protection and Biodiversity and Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas and species, populations and communities and heritage items. The approval of the Commonwealth Minister for the Environment is required for:

- An action which has, would have or is likely to have, a significant impact on 'matters of national environmental significance'.
- An action likely to have a significant impact on the environment in general (for actions by Commonwealth agencies or actions on Commonwealth land) or the environment on Commonwealth land (for actions outside Commonwealth land).

An action is considered to include a project, development, undertaking, activity or series of activities. An EPBC Act protected matters search was undertaken on 12 November 2013 for an area within a one kilometre radius of the proposal site. The results of the search are summarised in Table 3.1. As no impacts are predicted, an approval under the EPBC Act would not be required.

**Table 3.1 EPBC Act protected matters search results**

EPBC Act Protected matter	Matter located within search radius	Comments	Potential impact
World Heritage Property	None	The proposal would not impact on any World Heritage properties.	None
National Heritage Places	None	The proposal would not impact on any National Heritage properties.	None
Wetlands of international significance (Ramsar sites)	None	The proposal would not impact on any wetlands.	None
Threatened ecological communities	Western Sydney Dry Rainforest and Moist Woodland on Shale.	The proposal would not impact on any threatened ecological communities.	None
Threatened species	35 species including 14 birds, three frogs, seven mammals, 10 plant species and one reptile.	The proposal is located within a highly disturbed and developed urban area with limited vegetation (native or otherwise) that would provide habitat for migratory species.	None
Listed migratory species	19 species including seven migratory marine birds, eight terrestrial species, four wetlands species	The proposal is located within a highly disturbed and developed urban area with no vegetation (native or otherwise) that would provide habitat for listed migratory species.	None
Nuclear actions	None	The proposal does not involve a nuclear action.	None
Commonwealth Marine Areas	None	No Commonwealth marine areas are located within the search radius.	None
Great Barrier Reef Marine Park	None	The Great Barrier Reef Marine Park is outside the search radius.	None
Commonwealth land	Five Commonwealth properties, including Australian Broadcasting Corporation, Australian	The proposal would not directly or indirectly impact on any Commonwealth land.	None

EPBC Act Protected matter	Matter located within search radius	Comments	Potential impact
	Postal Corporation, Telstra Corporation Limited, Defence (Sydney University Regiment – Darlington) and one undefined piece of land.		
A water resource, in relation to coal seam gas development and large coal mining development	Not relevant	Not relevant	None

### 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. The following approvals/licences would be required:

- approval under section 60 of the *Heritage Act 1977*
- consent under section 138 of the *Roads Act 1993*.



## 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 over the next 20 years

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, approximately 52 per cent of the existing fleet would be replaced, and the size of the fleet would increase by approximately 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.

#### 4.1.2 Need for the proposal

To meet the needs of the expanded and air conditioned rail fleet, an increase in the power supply on the Sydney Trains electrical network is required. The power supply study undertaken for the Sydney Trains network (*Power Study 6*) identified that:

- the existing power supply in the vicinity of Central Station would reach capacity by 2016
- significant works would be required to upgrade Prince Alfred Substation to enable it to meet future requirements, including a need to upgrade all four rectifiers to 5 mega-watt (MW) units, and install a fifth rectifier as an operational spare.

### 4.2 Proposal development process

Sydney Trains (formerly the Rail Corporation New South Wales) undertook a study of the future traction power supply needs of the Sydney Trains network. This study is referred to as *Power Study 6*. The study identified that the existing Prince Alfred Substation at Central could not be easily upgraded to meet these requirements.

Further studies determined that the best solution would be to convert part of Prince Alfred Substation into a switching station, and build two new traction substations at Central. Sites at Lee Street and Chalmers Street were identified for the proposed substations. Transport for NSW then developed 'pre-concept' layouts for the substations. Following a tender process, GHD was awarded a professional services contract to prepare concept designs for the substations. The concept design process also involves an options, geotechnical, heritage and environmental impact assessment process. The results of the environmental impact assessment for the Lee Street Substation are summarised in this REF.

### 4.3 Objectives of the proposal

The objectives of the proposal are to:

- deliver 16 MW of firm traction power in the Central Station area and upgrade associated positive and negative 1500 volt (V) direct current (DC) feeders
- ensure the reliable operation of Waratah trains, and transition to an air-conditioned fleet
- replace end-of-life equipment within the Prince Alfred Substation
- improve reliability and redundancy in the 11 kV network (which supplies the emergency services and lighting in the City Circle stations)
- reduce safety risk to personnel and infrastructure that currently co-exist inside Prince Alfred Substation building by decommissioning Prince Alfred Substation
- achieve regulatory compliance and meet all RailCorp 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. Further information on the detailed options that have been developed and assessed is provided in the *Lee Street Substation Site Options Report*.

#### The 'do nothing' option

The 'do nothing' option involves not undertaking the proposal. Under this option, the Prince Alfred Substation would continue to operate in its current condition. 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 4.1. Studies have already shown that the existing power supply network cannot meet the future needs of Sydney Trains.

#### Upgrading Prince Alfred Substation

One option would be to upgrade the existing Prince Alfred Substation to meet current and future demand levels. This would involve upgrading all four rectifiers to 5 MW units. A fifth rectifier would also need to be installed as an operational spare. This option would mean the system would operate in a similar fashion to the existing, as the substation would remain in the same location. The upgrade of the Prince Alfred Substation was however not considered to be a viable option for the following reasons:

- much of the equipment within the substation is nearing the end of its economic life
- upgrading the existing substation would involve undertaking construction activities in an operational substation over long time durations (during rail shutdowns only), increasing the risk of network reliability issues
- the upgraded substation would not comply with existing building standards under the Building Code of Australia and *Australian Standard AS 2067-2008 Substations and high voltage installations exceeding 1 kV a.c.*, as a result of restrictions imposed by the site and its configuration
- it is a high cost option
- the Sydney Trains Electrical Operations Centre is located within the Prince Alfred Substation building and therefore any expansion within the building would require the relocation of these operations.

A sub-option was considered involving upgrading the substation's transformers to use ester oil to cool the transformers. This would potentially reduce the health and safety risks. However, this

sub-option was not considered to be feasible, as this type of transformer is not currently in operation on the network, and would not meet current standards.

### **Replacing Prince Alfred Substation with new substations at Lee Street and Chalmers Street**

This option would involve three components:

- converting Prince Alfred Substation to a switching station
- constructing a substation at Lee Street to supply traction power to the Sydney Central Yard tracks
- constructing a substation at Chalmers Street to supply traction power to the Main Line tracks around Central Station and provide supply to the 11 kV network.

Replacing Prince Alfred Substation with the new substations would address the non-compliance issues, as the new substations would be built in accordance with current standards and building guidelines. It would also avoid the risk of network reliability issues associated with upgrading the existing substation.

Although the proposed substations at Lee Street and Chalmers Street can be constructed and operated individually, both are required to meet the objectives of the PSU Program.

#### **Options for the location of the Lee Street Substation**

The site at Lee Street was identified as one of two preferred sites for the new substations based on consideration of the:

- limited space within the Central Station precinct
- location of existing services and infrastructure within the corridor and surrounding areas
- positioning of suitable feeding points to the overhead wiring structures within the Sydney Central Yard
- proximity to existing 33kV feeders within the Goods Line corridor
- relatively easy access to the site during construction.

Other locations in the vicinity of Lee Street were also considered (for example, within the bus layover area or Sydney Trains Depot). These options were not considered to be viable as a result of the constraints imposed by existing land uses.

#### **4.5 Preferred option**

In summary, the preferred option is to replace Prince Alfred Substation. To meet the objectives of the PSU Program, two substations are required. The Lee Street Substation, which is the subject of this REF, would supply traction power to the Sydney Central Yard tracks. The substation at Chalmers Street (which is the subject of a separate assessment and approval process) would supply traction power to the Main Line tracks around Central Station and provide supply to the 11 kV network.



## 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 Facilities and design features

#### 5.1.1 Substation building and equipment

The substation would comprise a two storey building to house the electrical equipment and associated facilities, and ancillary exterior facilities. The new building would be positioned above the Goods Line on a series of piles. The main switch room would be located on the 'first' floor of the building, and the basement would consist of a cable zone. This floor structure is designed to resist train impact forces in the event that the Goods Line is put back into service.

To provide the required clearances to the Goods Line, the floor of the main switch room would be located approximately 4 m above the level of the adjacent bus layover area. The ceiling of the main switch room would be approximately 5.2 m high. The maximum external height of the building would be 10 m above the bus layover area.

Overall, the substation would have a floor area of approximately 996 m<sup>2</sup>, comprising approximately 580 m<sup>2</sup> for the main switch room and approximately 416 m<sup>2</sup> for the basement.

The substation building would contain the following facilities and equipment:

- toilet and administration office
- four connected 33 kV feeders (797, 748, 7U1 and 7U6)
- two physically separate 33 kV switchboards and associated switchgear
- space for future 11 kV switchboard
- space for future 11 kV harmonic filter in an external enclosure
- space for future 33 KV/11 kV transformer in an external enclosure
- two 600 V/1500 V DC rectifiers
- two 600 V/415 V auxiliary transformers
- DC circuit breaker cubicles and equipment for the following:
  - two 1,500 V DC rectifier DC circuit breakers
  - four 1,500 V DC feeder DC circuit breakers
  - one DC 15,00 V DC for harmonic filter
  - one test bay, with spare DC circuit breakers
  - four three position isolating and rail connect switches in the 1,500 V DC isolating switch area
  - space for future direct current circuit breakers and links switches.

The following facilities would be located in outside yards, provided on the eastern side of the substation building:

- one 0.5 millihenry 6,400 A reactor
- two 33 kV/600 V AC rectifier transformers.

The external yards would be bunded and connected to an oil water separator system, which would be located below ground in the vicinity of the proposed car park located just off Lee Street. This facility would ensure that any spills are contained onsite.

Drawings showing the proposed layout of the substation and associated facilities are provided in Appendix B.

### **5.1.2 Building design**

The design of the substation building is currently being refined by the design team, with input from stakeholders and the project's heritage consultant (Rappoport Heritage Consultants). The substation is being designed to integrate all relevant considerations, including:

- the heritage significance of the State heritage listed Central Station site/group
- urban design and visual considerations
- functional and operational needs and requirements
- access and maintenance
- security.

Appendix B provides indicative concept designs for the proposal.

The basement floor and southern end of the main switch room would be constructed from precast hollow core planks with a reinforced concrete topping slab. The northern end of the substation level would be constructed from steel framed beams with a composite reinforced concrete slab. The roof would be steel framed. A masonry prefabricated panel system would be used for the walls. A brick façade would also be included in some areas of the substation.

The substation would be naturally ventilated, with louvres provided on the northern and southern walls to allow for air intake. Louvres on the eastern wall would provide for natural ventilation to avoid or minimise the need for mechanical ventilation.

### **5.1.3 Security fencing and lighting**

The external walls of the building would form the boundary of the majority of the site, with security fencing provided around the external stairs on the Lee Street frontage. This fencing would be approximately 2.7 m high, and would consist of welded mesh panels.

Security lighting would also be provided on site. The lighting would be designed to minimise light spill beyond the boundary of the site.

### **5.1.4 Site access and car parking**

Vehicular access to the proposal site would be via Lee Street from a new driveway off Lee Street, which is located between the bus layover and the entrance to 26 Lee Street. Parking for one vehicle would be provided adjacent to the external stairs on the Lee Street frontage. Vehicles leaving the substation would then travel through the bus layover area to the exit from the bus layover site, located at the intersection of Lee and Regent streets.

The substation building would be accessed via a set of stairs at the Lee Street frontage of the building. These stairs would provide access to the basement level of the substation building with internal access to the rest of the building.

A second set of stairs would be provided on the eastern frontage of the building, these stairs would provide access to the main switch room. The main purpose of these stairs would be to provide a second egress point.

### **5.1.5 Chemical storage**

The following quantities of fuel/chemicals would be stored onsite within an appropriately secure and bunded area within the substation building:

- approximately 3,300 litres of oil within the reactor
- approximately 10,924 litres of oil within the transformers (and 5,495 litres of oil in the future power transformer).

The bunded areas would be designed and constructed in accordance with relevant Australian Standards. Each transformer would be positioned within its own bunded area, which would be connected to an oil and water separator. This would collect all run off from the outdoor yards. The water would then be treated to separate oil and water. Water would be discharged to the stormwater network, while oil would be removed from site for disposal at a licenced facility.

### **5.1.6 Connection to existing overhead wiring system**

New traction supply cables are to be installed from the proposed substation to existing overhead wiring structures located within the Sydney Yard. The cables would be laid in new underground conduit and pits from the substation to the existing combined portal structures. Some modifications may be required for the existing guy anchor and termination insulators on the existing structures.

A new cable route would also be required to run the 1500V DC Traction Negative cables back from the tracks (i.e. an existing pit at the southern end of Platforms 4 and 5 at Central Station) to the new substation. This cable route would be constructed using under boring or micro-tunnelling techniques. A new pit would also be provided at the point in which the cable route changes direction. The cable route would enter the proposed substations cable basement via the existing concrete wall present on the western side of the cutting. The alignment of the cable route is shown in Figure 1.1.

### **5.1.7 Service connections**

The proposal would involve connections to Sydney Water's wastewater and potable water networks.

## **5.2 Construction information**

### **5.2.1 Indicative construction activities**

Construction would involve the following:

- site establishment:
  - services relocation or protection works for services located on or near the site (refer section 5.2.6)
  - establishment of the construction compound (refer section 5.2.4)
  - installation of safety fencing around the proposal site.
- piling works (32 piles to a depth of up to 10 m are currently proposed, however this is subject to confirmation during future design stages):
  - partial demolition of the existing bus layover area impact barrier wall and adjacent slab to enable new piles to be provided under the barrier wall
  - use of piling rigs to construct the piles outside the future rail alignment
  - reinstatement of the barrier wall.
- precast and composite slab construction for the two floors

- construction of the substation building on top of the slabs
- construction of new cable route for negative cables using micro tunnelling or under boring techniques
- electrical works and fit out, including connection to the electrical network
- site clean-up.

### **5.2.2 Construction workforce**

Construction of the proposal would involve a maximum workforce of approximately 20 people at any one time.

### **5.2.3 Equipment**

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

- |   |                            |
|---|----------------------------|
| • water cart                              | • tip trucks               |
| • concrete saws                           | • concrete agitator trucks |
| • backhoes                                | • concrete pumps           |
| • hand tools                              | • air compressor           |
| • jack hammers                            | • generators               |
| • light commercial and passenger vehicles | • road sweepers            |
| • mobile crane                            | • large delivery trucks    |
| • on site crane                           | • low loader.              |

### **5.2.4 Construction compound/s, access and vehicle movements**

#### **Construction compound/s**

There is limited space available in the study area for establishing a construction compound. Two potential sites are being considered. The final location would be confirmed by the construction contractor.

The first potential site would be within the existing Sydney Trains Depot on the eastern side of the Goods Line. As this site is operational there is likely to be limited space available.

The second potential site would be within the Goods Line corridor cutting. To prepare this site for use as a compound, the existing tracks would need to be buried under ballast and then the site would need to be levelled. Pedestrian access into the cutting would need to be provided via a temporary set of stairs. Vehicular access would need to be provided via a gate into the rail corridor at the southern end of the bus layover area. Although this track is currently disused it does form part of the operational rail corridor. Therefore, to enable this area to be used as a construction compound, possession would need to be arranged for the duration of the construction period. This would involve lodgement of a possession request with Sydney Trains.

As a result of the limited space available, the majority of construction equipment and materials would need to be stored off site and only transported to site when required.

Each of the above locations has been considered by this REF.

Once the contractor has a preferred location for the compound and any stockpile areas, consultation with Transport for NSW would be undertaken to confirm the suitability of the location and whether any additional environmental assessment is required.

The site/s would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of construction, the temporary site

compound, work areas and any stockpiles would be removed, the site/s would be cleared of all rubbish and materials, and rehabilitated.

As noted in the equipment list provided in section 5.2.3, cranes may be required to deliver materials and equipment to the proposal site. The positioning of the cranes would need to be confirmed by the construction contractor. Potential locations would include the existing bridge over the Goods Line, the Sydney Trains Depot (and entrances area) or the bus layover area.

### **Construction access and parking**

Access to the proposal site would be via the bus layover area off Lee Street, using the existing access to the layover site.

The arrangements for and availability of construction vehicle and employee parking would need to be confirmed by the construction contractor. Potential parking locations would include the Sydney Train Depot and the Goods Line corridor, however both these sites have limitations in terms of space and access. Employees would be encouraged to use public transport to access the site.

### **Vehicle movements**

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

It is estimated that construction vehicle movements would involve a daily maximum of approximately:

- four heavy vehicles during the construction period - resulting in eight movements per day
- eight heavy vehicles during concrete pours - resulting in 16 movements per day
- ten light vehicles during the construction period (assuming that approximately half of the workforce would travel to the site via public transport) - resulting in 20 movements per day.

The delivery of some equipment, such as transformers, would be considered oversized deliveries. These deliveries would be undertaken in accordance with the requirements of relevant authorities.

## **5.2.5 Construction timing, staging and work hours**

### **Construction timing**

It is anticipated that construction of the proposal would commence in late 2014, and would take approximately 15 months to construct. The main civil construction activities would be completed within 10 months, while the fit out of the substation would take five months.

### **Work hours**

Construction would generally 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
- No work would occur on Sundays or public holidays.

Out of hours works (including work on Sundays) would be limited mainly to scheduled track possession periods, however some out of hours works would be required outside of these

periods. Works that may need to be undertaken during track possessions and out of hours include connection to the overhead wiring system, installation of certain electrical equipment, delivery of oversized equipment, construction of the new cable route for the negative cables and undertaking works that need to be done from the bus layover area.

As the proposal is located within the operational rail corridor (albeit the track is not used), construction would require an extended possession request to be lodged undertake works within and above the Goods Line cutting. It is likely that a number of possessions would be required to undertake the work to connect the substation to the overhead wiring. These possessions are prearranged by Sydney Trains. Currently there are only two possession periods available within the Sydney Yard. There may be a requirement for one or more additional special possessions to be arranged to complete the proposal. Should additional possessions be required, they would be arranged via Transport for NSW and the Sydney Trains possessions coordinator. Controlled power outages, which may need to occur out of hours, would also be required during construction.

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

### **5.2.6 Services relocations**

A number of services are located within or in the immediate vicinity of the proposal site, including:

- an AusGrid electricity pole located at the new Lee Street entrance
- a Jemena gas line which travels past the site within the Lee Street road corridor
- Optus infrastructure which travels past the site within the Lee Street road corridor
- Sydney Water wastewater infrastructure, located within the small grassed area located adjacent to Lee Street in the western portion of the site.

Some of these services would need to be relocated. The approach to any service relocations would be confirmed during the detailed design phase. Where possible relocation of services would be avoided.

## **5.3 Operation of the proposal**

The main function of the substation would be to convert the incoming 33 kV power supply to a form 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.

No permanent staff members would be located on site.

Maintenance visits would be undertaken by Sydney Trains personnel approximately three times a month. These visits would generally involve one utility vehicle accessing the site. In emergency situations additional vehicles may need to access the site.

The potential impacts of operation are considered in Section 7.

## 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 during REF preparation

As outlined in section 3.2.1, formal statutory consultation under the Infrastructure SEPP is not required. Consultation during preparation of the REF involved consultation with relevant government agencies in the form of a letter providing information on the proposal and inviting input in terms of issues and/or assessment requirements. The following agencies were contacted:

- Roads and Maritime Services
- Heritage Division of the Office of Environment and Heritage
- Council of the City of Sydney
- Sydney Trains
- State Transit Authority of NSW.

A summary of the responses received is provided in Table 6.1.

**Table 6.1 Issues raised by government agencies**

Agency	Issues raised	Response/where addressed in the REF
Heritage Division of the Office of Environment and Heritage	Environmental assessment should include a Statement of Heritage Impact which should include reference to existing documents such as the Central Station Conservation Management Plan.	Refer section 7.1 and Appendix C.
	Heritage assessment should include consideration of visual impacts and potential archaeological issues.	Refer section 7.1 and Appendix C.
Sydney Trains	Impacts on heritage should be minimised through the design phase so that works do not detract from heritage values. The design must be in line with the Central Station Conservation Management Plan.	Refer section 7.1 and Appendix C. The design process has been undertaken in consultation with relevant stakeholders, and has included elements (e.g. brick facades) to minimise the potential for heritage impacts. As the design progresses, it would continue to take into account heritage values and the conservation management plan.
	Consultation between Transport for NSW and Sydney Trains should continue throughout the design process in relation to heritage.	Sydney Trains would continue to be consulted in relation to the design.

Agency	Issues raised	Response/where addressed in the REF
	The preferred heritage outcome is to adaptively reuse and retrofit existing buildings, such as Rolling Stock Officers building or the Prince Alfred Substation.	An option to refit Prince Alfred Substation was considered as discussed in section 4.4. This option was not considered to be feasible for a number of reasons.
	Where existing building cannot be reused, any new construction must be designed in relation to the heritage precinct and adjacent public spaces.	The design has been developed to ensure that the new substation is consistent with the surrounding environment.
	Heritage elements in the vicinity of the proposal identified as having 'high' value should be retained in situ and conserved. Only in exceptional circumstances would it be acceptable to impact such elements.	The proposal would result in some direct impacts to a sandstone wall which is considered to have heritage significance. These impacts would include the temporary removal (and reinstatement) of the fencing currently affix to the top of the sandstone wall. The project is not expected to result in any direct impacts to any other heritage items. Further discussion of the heritage impacts can be found in section 7.1.
	Cumulative heritage impacts should be considered with other developments within the precinct.	Refer section 7.11.2.
	The Darling Harbour Branch Line is the earliest cutting and overbridge systems in NSW. Building a substation over this infrastructure requires strong justification and consideration of alternatives during design development.	Section 4 provides information on the options considered. The potential heritage impacts are considered in section 7.1 and Appendix C.
	Indirect impacts to the Darling Harbour Branch Line need to be considered.	Refer section 7.1 and Appendix C.
	The NSW Industrial Noise Policy should be considered for operational noise impacts, including impacts on sleep disturbance.	Refer section 7.3.
	Consideration should be given to Sydney Trains document, Guide to Noise and Vibration from Rail Facilities.	Refer section 7.3 and Appendix D.
	The environmental assessment should consider the energy efficiency performance of the substation.	<p>The use of energy for auxiliary services within the substation is considered to be a small proportion of the substations total load. As the substation is to be an unattended site, auxiliary energy usage would be sporadic and would depend on when visits to the site are made by the operators or maintenance staff (about three times a month).</p> <p>The following is a summary of the initiatives to minimise energy use:</p> <ul style="list-style-type: none"> <li>• Substation is naturally ventilated with the exception of a small air-conditioner within the office area,</li> </ul>

Agency	Issues raised	Response/where addressed in the REF
		which would only operate when personnel are on site. <ul style="list-style-type: none"> <li>• Internal lighting within the substation shall only be in use when personnel are on site.</li> <li>• Small hot water heater on site would only be in use when personnel are on site.</li> </ul>
	The environmental assessment should consider the Australian National Health and Medical Research Council interim guidelines relating to the impacts of magnetic field exposure during operation.	Refer section 7.8.

Responses from the other agencies were not received. Consultation with utility providers (e.g. Sydney Water) was undertaken as part of the design process. These agencies were not separately consulted as part of the REF process, as the design of the proposal has taken their needs into account.

## 6.2 Consultation during public exhibition

The REF will be placed on public exhibition for a period of three weeks, during which time written submissions will be accepted. The REF will be exhibited at the following locations:

- Transport for NSW Community Information Centre, located at the ground floor of 388 George Street, Sydney, opening hours: Monday to Friday - 9am to 5pm.
- Surry Hills Library, located at 405 Crown Street, Surry Hills, opening hours: Monday, Wednesday, Friday - 10am to 6pm; Tuesday - 10am, to 8pm; Thursday - 10am to 10.30pm; Saturday and Sunday - 10am to 4pm.

The REF would also be available via the Transport for NSW website at: [www.transport.nsw.gov.au/projects](http://www.transport.nsw.gov.au/projects).

Surrounding landowners and occupants would be contacted prior to the exhibition period. This would involve provision of a letter providing information on the exhibition process and how to provide feedback.

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

- Transport for NSW's 1800 number (1800 684 490)
- Transport for NSW's project email address ([projects@transport.nsw.gov.au](mailto:projects@transport.nsw.gov.au))
- Transport for NSW's project webpage ([www.transport.nsw.gov.au/projects](http://www.transport.nsw.gov.au/projects)).

## 6.3 Post-exhibition consultation activities

Following exhibition, Transport for NSW will consider the issues raised 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 information line and email address would continue to be available.

Targeted consultation methods, such as letters, notifications, signage and verbal communications, would occur as required.

# 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 Non-Aboriginal heritage

An assessment of the potential heritage impacts of the proposal has been undertaken by Rappoport Heritage Consultants in May 2014, and a Statement of Heritage Impacts has been prepared. The results of this assessment are summarised below. The full assessment report is provided in Appendix C.

### 7.1.1 Assessment approach and methodology

The assessment involved:

- identifying listed heritage items in the vicinity of the proposal site:
  - searching relevant databases including the Australian Heritage Places Inventory and the NSW State Heritage Inventory
  - reviewing the heritage listings and maps under the Sydney LEP.
- a site survey and photographic inventory
- reviewing the proposal description
- preparing a Statement of Heritage Impact in accordance with *Statements of Heritage Impact* (Heritage Office and Department of Urban Affairs & Planning, 1996) and *Assessing Heritage Significance* (Heritage Office, 2001) and in accordance with the principles contained in *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*.

### 7.1.2 Existing environment

#### Heritage listed items

The proposal site is located within a historically important area of Sydney as a result of its inner urban location and its vicinity to Central Station. It is within the curtilage of the following heritage listed items:

- Sydney Terminal and Central Railway Stations Group (listed on the State Heritage Register)
- Central Railway Station and Sydney Terminal Group (listed on the RailCorp Section 170 Heritage Register)
- Central Railway Station group including buildings, station yard, viaducts and building interiors (listed on the Sydney LEP)
- Central Railway Station (National Trust of Australia; non-statutory listing).

The following heritage items are located in the vicinity of the proposal site:

- Darling Harbour railway cutting (also forms part of the Central Station Group listed under the Sydney LEP) – the proposal site is located above part of this cutting
- Ultimo Railway Overbridge (listed on the State Heritage Register and Sydney LEP) – the southern entrance of this item is located adjacent to the northern edge of the proposal site

- Mortuary Station (listed on the State Heritage Register and Sydney LEP) – located approximately 200 m to the south of the proposal site.

The Sydney Terminal and Central Railway Stations Group (the Central Station site/group) includes a number of individual elements that are located in the vicinity of the proposal site. These are as follows:

- brick retaining wall on the western side of the Goods Line cutting – located under the proposal site
- sandstone wall on the eastern side of the Goods Line cutting – located under the proposal site
- brick store building on the eastern side of the Goods Line cutting – located approximately 10 m from the proposal site
- brick wall along Regent and Lee Streets – located approximately 30 m from the proposal site.

The above items are shown in Figure 7.1, with the significance of each item outlined in Table 7.1.

### Heritage significance

The statement of significance for the Central Station site/group notes that it has high heritage significance at a State level. This is as a result of its role within the rail network, its historical, aesthetic, technical values, and its research potential. This overall significance level does not automatically apply to the individual elements of the site/group. A conservation management plan has been prepared for Central Station. This plan seeks to provide guidance for the conservation of components of the station which have conservation value. The heritage assessment has taken into account this document.

Figure 7.1 summarises the significance of the elements within the Central Station site/group located in the vicinity of the proposal site.

**Table 7.1 Significance of elements within Central Station site/group**

Element	Significance
Darling Harbour cutting (western yard precinct).	High significance at a State level.
Brick retaining wall on the western side of the cutting adjacent to the proposal site.	High significance for its historic, associational, aesthetic, social, technical/research, rarity and representative value.
Sandstone wall on the eastern side of the cutting adjacent to the proposal and the associated metal fence.	Moderate significance for its historic, associational, aesthetic, social, technical/research, rarity and representative value.
Brick store building located to the south of the proposal site within the Sydney Trains Depot on the eastern side of the cutting.	Low significance at a local level.
Brick wall located along Lee and Regent streets adjacent to bus layover area.	Some local significance.
Botany Road Sidings	Moderate significance.
Administration and service group	Little significance.
Henry Deane Plaza	Little significance.
Sydney Yard	Moderate significance due to its continued use as a railway yard.

Element	Significance
Former John Storey Memorial Dispensary Building	High significance.

### Archaeological potential

The archaeological potential of the land on which the proposal is located is considered to be minimal. The conservation management plan states that archaeological investigation is not required for excavation within the vicinity of the proposal.

### 7.1.3 Impact assessment

#### Construction

Potential building related construction vibration impacts are considered in section 7.3.4.

There is the potential that the movement of construction vehicles and equipment could result in accidental damage to individual elements associated with the Central Station site/group. This potential impact would be minimised by the implementation of measures provided in sections 7.1.4 and 7.3.5.

The potential for archaeological impacts is considered to be minimal. The Central Station Conservation Management Plan notes that the area within which the proposal site is located does not require archaeological investigation. The LEP listing also notes that this area has minimal archaeological potential. The minimal excavation required to construct the proposal would further minimise the potential for impacts of impacting archaeological items.

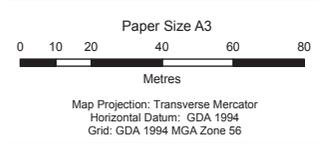
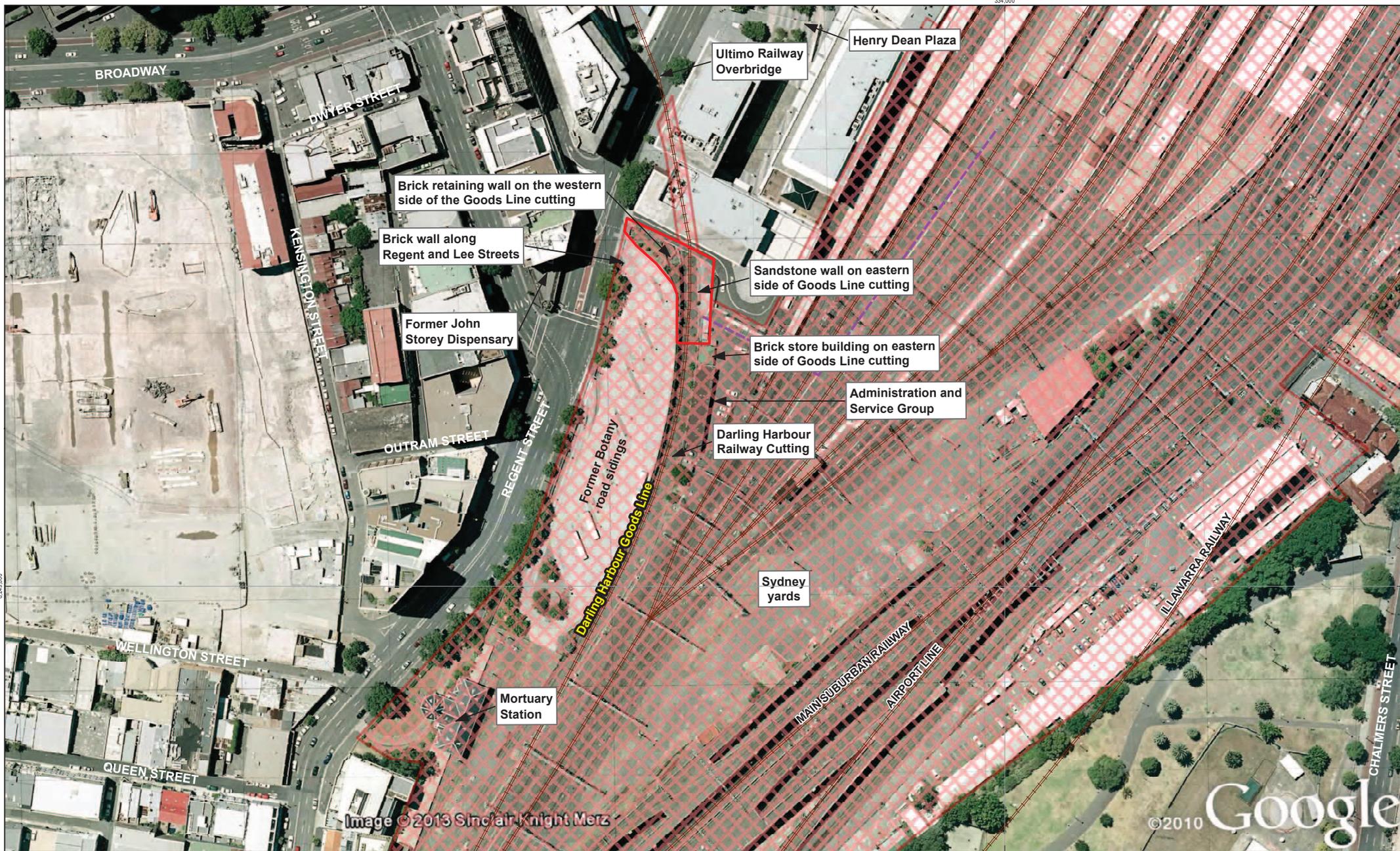
#### Operation

The proposal has been designed to integrate all relevant considerations, including the heritage significance of the State heritage listed Central Station site/group.

Table 7.2 provides a summary of the findings of the heritage assessment in terms of the potential heritage impacts of the proposal on the elements of the Central Station site/group located in the vicinity of the proposal site.

Overall, the heritage assessment concludes that the proposal would have a minimal impact on the heritage significance of the Central Station site/group as a whole, and a minimal impact on the individual elements of the site/group. This is because the substation is being designed to take into account the heritage significance of the study area, and it would be constructed using materials (brickwork on the buildings façade) that would complement the nearby heritage listed buildings and items (through the selection of materials), while clearly distinguishing the new building as a contemporary structure (through the curved form and bold steel elements which are seen as contemporary in nature). The substation building achieves sympathy through the use of utilitarian/industrial style benefit the Central Station site/group.

As noted in section 3.3.1, an application for approval from the Heritage Council will be submitted in accordance with section 60 of the *Heritage Act 1977*.



- LEGEND**
- Proposal site
  - Central Station site/group
  - Proposed negative cable route



Transport NSW  
REF- Lee St Substation

Job Number 21-22993  
Revision A  
Date 30 May 2014

Heritage items

Figure 7.1

**Table 7.2 Summary of the potential for heritage impacts on the Central Station site/group**

Item	Significance	Potential for heritage impacts		
		Physical	Visual	Overall
Central Station group as a whole	High	Minimal	Minimal	<b>Minimal.</b> The proposal would not block any of the main views to the item. No elements of significance would be demolished or physically contacted. The design of the proposal is sympathetic to the heritage character and significance of the site, as well as being readily distinguishable from it.
Western yard as a whole	High	Moderate	Moderate	<b>Moderate.</b> As described above, there would be minimal physical impact on significant elements in the western yard. The proposed substation would constitute a new moderate-sized element within the Western Yard and would result in some views of the Darling Harbour Cut being blocked. The design of the proposal is sympathetic to the heritage character and significance of the site, as well as being readily distinguishable from it.
Ultimo Railway overbridge and tunnel	High	None	Minimal	<b>Minimal.</b> The proposal visually obscures the mouth of the tunnel but makes no physical contact. The tunnel would remain physically intact and accessible.
Mortuary Station	High	None	None	<b>Nil.</b> The proposal is located too far away from this item to have any potential impacts on it.
<b>Elements within the Central Station item/group</b>				
Darling Harbour (Goods Line) cutting including track and bed	High	None	Moderate	<b>Moderate.</b> The proposal would obscure views of the cutting but would leave it intact and physically accessible.
Brick retaining wall on the western side of the Goods Line cutting	High	None	Moderate	<b>Moderate.</b> The proposal would obscure views of the cutting but would leave it intact and physically accessible.
Sandstone wall on eastern side of Goods Line cutting	Moderate	Minimal. Temporary removal of fence atop the sandstone wall for reinstatement following construction	Minimal	<b>Minimal.</b> The proposal would involve the removal of the fence on top of the stone wall prior to construction commencing. This fence would be reinstated at the end of the construction period. The proposal makes no contact with the wall and leaves it visually accessible (once reinstated). There is potential for vibration impacts depending on the method of piling. This potential impact would be addressed by the implementation of the mitigation measures provided in sections 7.1.4 and 7.3.5.
Brick store building on eastern side of Goods Line cutting	Moderate	None	Minimal	<b>Minimal.</b> The proposal makes no contact with this item. The store would remain visually and physically accessible. The proposal would be larger in scale and bulk than the store; however it would be sympathetic to the store through the use of similar brickwork.
Brick wall along Regent and Lee Streets	Low	None	Minimal	<b>Minimal.</b> The proposal would be visible together with the wall as part of the streetscape, but would be sympathetic to it.

Item	Significance	Potential for heritage impacts		
		Physical	Visual	Overall
Sydney Yards	Moderate	Minimal	None	<b>Minimal.</b> The proposed negative cable crossing would involve impacts within the yard, however not within the area of archaeological potential.
Henry Deane Plaza	Little	None	Moderate	<b>Minimal.</b> The proposal would block certain views of the lower floors of the plaza from the south, however due to the low significance of this item and the sympathetic nature of the proposal impacts would be minimal.
Former John Storey Memorial Dispensary Building	High	None	Minimal	<b>Minimal.</b> The proposal would not block any views of this item and would be sympathetic with this building and therefore impacts are minimal.

#### 7.1.4 Mitigation measures

##### Construction

The following mitigation measures would be implemented to minimise the potential impacts to the heritage significance of the study area, and individual heritage listed items:

- Creation of a photographic archival recording of the site prior to construction, in particular the Darling Harbour cutting in the vicinity of the proposal.
- Development and implementation of a Heritage Interpretation Strategy for the Western Yard as a whole with reference to the identified items of significance within it, notably the Ultimo Overbridge and Darling Harbour Cut, in consultation with all relevant stakeholders including Sydney Trains and Transport for NSW. Elements of such a strategy should include interpretive signage and online material among other means.
- Exploration of any current or future options for public pedestrian and bicycle access from Mortuary Station to and through the Darling Harbour Cutting and the Ultimo Overbridge, for example connecting to the current Goods Line project.
- Removal of vegetation from along the Cutting in order to investigate and confirm location and condition of items mentioned in the CSCMP, viz., the 1857 sewer, the oviform drain, etc.
- All heritage items in the immediate vicinity of the proposal site would be marked on site plans, fenced off where appropriate, and avoided.
- Dilapidation surveys would be undertaken for heritage buildings/structures located in the immediate vicinity of the proposal.
- The sandstone wall located on the eastern side of the cutting would need to be protected. The following activities would be undertaken to protect the wall:
  - Carry out survey of the wall and fence showing positioning of all stones drawn unto their joints in plan and elevation, and the position of fence palisades including major supports. An allowance would be made for repair of the sandstone wall, especially the plinths stones, which show signs of case hardening, delamination and salt attack. The existing pointing would be removed and repointed.
  - Cut required sections of fence palisades at 300 mm above plinth stone level.

- Provide framed and braced timber hoarding over the wall to box in top and both vertical faces lines with solid plywood (15 ply) making sure that a solid protective base is provided that enables construction access during works.
- Following completion of the works, the fence would be re-welded in the same position by a wrought iron repair specialist, taking care to ensure that following welding, each joint is ground smooth so that the joint cannot be seen.
- A nominated heritage architect would inspect the wall and fence prior to and immediately after construction. The architect would also preside over de-pointing and re-pointing of sandstone block wall and the welding of the palisade fencing.
- The western retaining wall and associated fence would be protected with the use of hoarding to minimise accidental damage from construction works.
- The western retaining wall would be monitored during construction to ensure it is not impacted.
- For works in the vicinity of both the western and eastern walls, work methods and equipment would be carefully selected to minimise any impacts on the walls in particular any vibration impacts.
- If any unanticipated archaeological deposits are identified within the proposal site during construction, work likely to impact on the deposit would cease immediately and the NSW Heritage Council and an archaeologist would be contacted. Where required, further archaeological work and/or consents would be obtained prior to works recommencing at the location.

## Operation

The following mitigation measures would be implemented to minimise the potential impacts to the heritage significance of the study area, and individual heritage listed items:

- The design of the proposal would be finalised in accordance with the Central Station Conservation Management Plan, the heritage significance of the surrounding area and the findings of the Statement of Heritage Impact.
- The materials selected would be sympathetic to the surrounding heritage items/elements, while also clearly marking the building as contemporary.

## 7.2 Soils and water quality

### 7.2.1 Existing environment

#### Geology, topography and soils

The *1:100,000 Geological Series Sheet for Sydney* (Geological Survey of NSW, sheet 9130, Edition 1, 1983) shows that the proposal site overlies Ashfield Shale of the Wianamatta Group, and Hawkesbury Sandstone. The site is situated on a topographic high, and it is expected that bedrock would occur at a relatively shallow depth.

The site is located within the Blacktown soil landscape as shown on the *Soil Landscapes of Sydney 1:100,000 Sheet* (Chapman et al, 1983). This landscape is characterised by shallow to moderately deep red and brown podzolic soils on crests, upper slopes and well drained areas and deep yellow podzolic soils on lower slopes and areas of poor drainage.

Geotechnical investigations undertaken by GHD (2014) identified that the majority of the site is likely to be underlain by areas of imported fill to depths between 1.3 m and 3 m. The fill material observed generally consisted of sandy clay and clay, with zones of clayey sand and sandy gravel. The material contained some black plastic, timber and road base materials. Some

residual soil was encountered in a number of boreholes, which consisted of stiff to very stiff, medium to high plasticity clay and overlaid bedrock.

Bedrock was found 1.8 m and 3.5 m deep, with the quality of the rock varying at different depths.

### **Contamination**

A search of the EPA's Contaminated Land Record was undertaken on the 12 November 2013 for the City of Sydney LGA. No contaminated sites were identified in the vicinity of the proposal site. A search of the list of NSW contaminated sites notified to the EPA was also searched for the suburbs of Chippendale and Haymarket. One contaminated site notified to the EPA is located 650 m to the north-east of the site on Foveaux Street.

The contamination assessment undertaken by GHD (GHD 2014a) noted that the concentrations of heavy metals within the soil and groundwater samples were below guideline levels.

### **Surface water**

The western component of the proposal site drains towards Lee Street and the stormwater drainage system located along the road. To the east of the proposal site, stormwater is collected in kerbs and gutters and feeds into the stormwater drainage network.

The Goods Line drains towards Darling Harbour to the north-west via track drainage infrastructure.

There are no watercourses or drainage lines in the vicinity of the proposal site.

### **Groundwater**

A search of the Natural Resources Atlas on the 12 November 2013 identified that there are no registered boreholes located in the vicinity of the proposal site.

Groundwater monitoring equipment was installed as part of the geotechnical investigations (GHD 2013). Groundwater was identified at a depth of about 8.04 m, with the depth to groundwater considered to be variable (e.g. higher following wet weather).

### **Water quality**

The quality of surface water runoff in the vicinity of the proposal site would be impacted by existing land uses, including the bus layover area and rail corridor.

## **7.2.2 Impact assessment**

### **Construction**

#### ***Soil disturbance***

As the majority of the substation would be located above the Goods Line, there would be minimal impacts to soils. Limited excavation would be required to construct the footings, and this would be undertaken in areas which have previously been disturbed as a result of the construction of the Goods Line cutting. As a result, construction of the proposal would have only minimal potential to result in erosion and sedimentation of exposed soils during periods of wind and rainfall, and associated water quality impacts. Any erosion and sedimentation impacts would be temporary and short-term in duration, and would be minimised by the implementation of the mitigation measures provided in section 7.2.3.

#### ***Contamination issues***

As no areas of contamination were identified during the investigations undertaken, it is considered that construction would be unlikely to encounter contaminated soil. The approach to

managing any unexpected contaminated finds would be specified in the construction environmental management plan (CEMP).

The proposal would have 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 on site. The potential for impacts as a result of any spills or leaks would be managed by the implementation of measures provided in section 7.2.3.

### **Groundwater**

The footings would potentially intersect groundwater. However, the potential for impacts are considered to be minimal as a result of the small scale and temporary nature of the works.

### **Operation**

The proposal would not result in any impacts to soils or water quality. Appropriate bunding would be incorporated into the design of the proposal to contain any chemical spills or leaks (refer section 5.1.5).

Use of the site for the proposal (i.e. for a unstaffed substation) is considered to be suitable from a contamination point of view.

## **7.2.3 Mitigation measures**

### **Construction**

The measures provided below would be implemented during construction:

#### **Soil disturbance**

A soils and water quality sub-plan would be prepared as part of the CEMP. It would include the following measures:

- Sediment and erosion control devices would be installed to minimise transport of sediment in accordance with *Managing Urban Stormwater, Soils & Construction, Volume 1* (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.
- Temporary stormwater control devices or erosion and sedimentation controls would be implemented at stormwater drains to prevent sediment-laden runoff entering the local stormwater system.
- Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept. Sediment would be cleared from behind barriers/sand bags on a regular basis and all controls would be managed to ensure they work effectively at all times.
- Any material transported onto pavement surfaces would be swept and removed at the end of each working day when it is safe to do so.
- 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.
- Refuelling of plant and equipment would not be undertaken within the proposal site.

- 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*.

#### **Contamination**

- An unexpected findings 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 environmental consultant can advise on the need for remediation or other action.

#### **Groundwater**

- Should groundwater be encountered during construction activities, appropriate management measures such as water testing, dewatering, temporary water storage and treatment facilities would be implemented to manage any groundwater that seeps into excavations.

#### **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 representative location for seven days to determine existing noise levels in the vicinity of the site. 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:
  - *Interim Construction Noise Guideline* (DECC, 2009)
  - *Construction Noise Strategy* (Transport for NSW, 2012)
  - *Assessing Vibration: a Technical Guideline* (DEC, 2006)
  - *Environmental Management System Guide Noise and Vibration from Rail Facilities* (Sydney Trains, 2013).
- 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 4.2.1 and 5.1 of Appendix D.

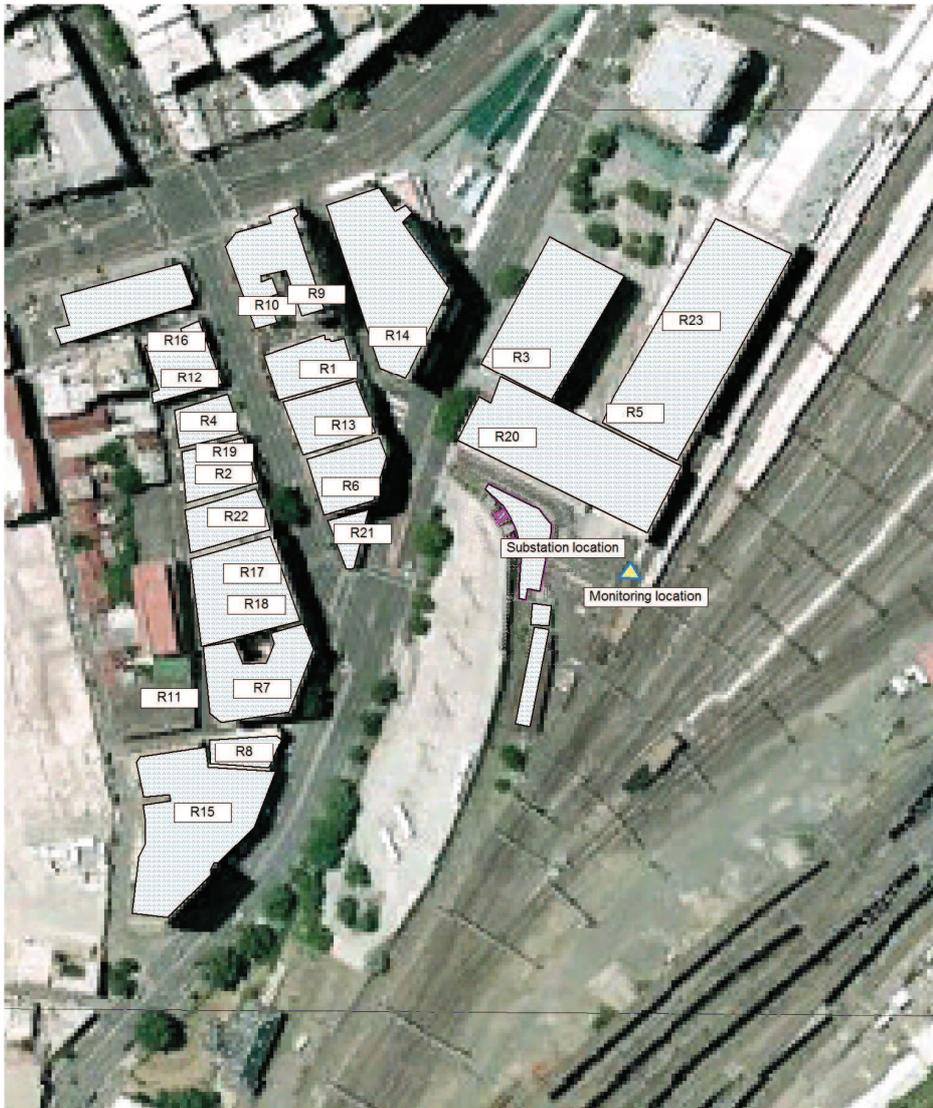
### 7.3.2 Existing environment

Noise and vibration sensitive receivers were defined based on the type of occupancy and the activities undertaken. A 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 is shown in Figure 7.2.

The background noise in the study area is typical of an inner urban area, and is influenced by rail, road traffic and general noise associated with surrounding land uses. Background noise monitoring was undertaken at a location to the east of the proposal site, in the vicinity of the Great Southern Rail car loader (shown on Figure 1.1). A summary of the measured noise levels is provided in Table 7.3.

**Table 7.3 Noise monitoring results**

Rating background level 90 <sup>th</sup> percentile $L_{A90(15min)}$ (dB(A))			Ambient noise levels, $L_{Aeq(period)}$ (dB(A))		
Day	Evening	Night	Day	Evening	Night
54	51.6	46.4	62.2	60.9	57.4



**Figure 7.2 Location of receivers in the vicinity of the proposal**

### 7.3.3 Assessment criteria

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

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

Table 7.4 and Table 7.5 provide the noise criteria for the proposal based on consideration of the guidelines listed in section 7.3.1. Table 7.6, Table 7.7 and Table 7.8 provide the vibration criteria for human comfort and structural damage. Currently, there is no Australian Standard that sets criteria for the assessment of building damage caused by vibration. Guidance of limiting vibration values is attained with reference to German Standard *DIN 4150-3: 1999 Structural Vibration – Part 3: Effects of vibration on structures* (refer to Table 7.8).

**Table 7.4 Proposal specific construction noise criteria**

Receiver	Construction noise management level, $L_{Aeq(15min)}$ (dB(A))					Sleep disturbance screening test $L_{Amax}$ (external)
	During standard recommended hours		Outside of standard recommended hours			
	Noise affected	Highly noise affected	Day 7 am to 8 am and 1 pm to 6 pm Saturday, 8 am to 6 pm Sunday & Public Holidays	Evening 6 pm to 10 pm Monday to Sunday & Public Holidays	Night 10 pm to 7 am, Monday to Saturday; 10 pm to 8 am Sunday & Public Holidays	Night 10 pm to 7 am, Monday to Saturday; 10 pm to 8 am Sunday & Public Holidays
R1 – R16: Residential	64	75	59	57	51	61
R17: School classroom (educational)	45	-	-	-	-	-
R18: Recreation	65	-	-	-	-	-
R19 to R23: Commercial	75	-	-	-	-	-

**Table 7.5 Proposal specific operational noise criteria**

Receiver	Time period	Amenity criteria (acceptable noise level) <sup>1,2</sup> L <sub>Aeq(period)</sub>	RBL, L <sub>Aeq(15min)</sub>	Intrusive criteria, L <sub>Aeq(15min)</sub>	Proposal specific noise criteria (external)	Sleep disturbance screening test (external)
Residential receivers (R1 to R11)	Day	60	54	59	59 L <sub>Aeq(15min)</sub>	-
	Evening	50	52	57	50 L <sub>Aeq(evening)</sub>	-
	Night	45	46	51	45 L <sub>Aeq(night)</sub>	61 L <sub>Amax</sub>
Accommodation premises <sup>3</sup> (R12 to R16)	Day	65	-	-	65 L <sub>Aeq(day)</sub>	-
	Evening	50	52	57	50 L <sub>Aeq(evening)</sub>	-
	Night	45	46	51	45 L <sub>Aeq(night)</sub>	61 L <sub>Amax</sub>
Commercial premises (R19 to R23)	When in use	65	-	-	65 L <sub>Aeq(period)</sub>	-
School classroom (internal, R17)	Noisiest 1-hour period	35	-	-	45 L <sub>Aeq(1hr)</sub>	-
Active recreational area (R18)	When in use	55	-	-	55 L <sub>Aeq(period)</sub>	-

Note 1: With consideration of the *Industrial Noise Policy* (EPA, 2000) 'noise amenity area' classification, the residential receivers surrounding the Lee Street substation have been classified as 'urban'.  
 Note 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.  
 Note 3: Accommodation spaces have been treated as commercial premises during the day and residential premises during the evening and night time periods.

**Table 7.6 Human comfort intermittent vibration limits (BS 6472-1992)**

Receiver type	Period <sup>1</sup>	Intermittent vibration dose value (m/s <sup>1.75</sup> )	
		Preferred value	Maximum value
Residential	Day	0.2	0.4
	Night	0.13	0.26
Educational institutes	When in use	0.4	0.8

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

**Table 7.7 Guidance on effects of vibration levels for human comfort (BS 5228.2 – 2009)**

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	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.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

**Table 7.8 Guideline values for short term vibration on structures**

Type of structure	Guideline values for velocity, (mm/s)		
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz <sup>1</sup>
Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	40 to 50
Dwellings and buildings of similar design and/or occupancy.	5	5 to 15	15 to 20
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).	3	3 to 8	8 to 10

Note 1: At frequencies above 100 Hz the values given in this column may be used as minimum values.

### 7.3.4 Impact assessment

#### Construction noise

Table 7.9 lists the modelled construction noise levels for all potential receivers. The results of modelling indicate that the noise generated by construction is predicted to exceed the noise affected noise management levels at residential receivers R1, R6, R7 and R8 (all on Regent Street) and R9 (located on George Street). It is predicted that the highly noise affected noise management levels would be exceeded at the ground floor of sensitive receiver R6 (at 18 Lee Street).

The noise affected noise management levels are also predicted to be exceeded at the following receivers:

- Leisure Inn Sydney Central (R13)
- Mercure Hotel Sydney on Broadway (R14)
- AEA Central serviced apartments (R15)
- Curtin University Sydney (R17)
- YMCA Sydney (R18)
- Gateway House (R20).

The exceedences shown in Table 7.9 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).

#### **Out of hours work and sleep disturbance**

Out of hours work (e.g. connection of substation to overhead wiring structures and installation of some equipment) is not expected to cause adverse impacts at sensitive receivers. It is recommended that noise monitoring be conducted at the start of any out of hours works to confirm compliance with the out of hour works noise management levels and sleep disturbance criteria.

#### **Traffic noise**

In accordance with the Road Noise Policy (DECCW, 2011), construction traffic noise is considered acceptable when it is within 2 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 approximately 3 dB(A). The proposal would only result in a small increase in vehicles (approximately 40 movements), which is a minor increase when compared with existing traffic levels

(refer section 7.5.2). Therefore, the proposal would not result in any exceedance of the road traffic noise criteria.

## **Construction vibration**

### ***Human comfort***

The assessment indicates that there is the potential for some vibration (human comfort) impacts at sensitive receivers where ground compaction is undertaken within 50 m of receivers. Piling activities would be required, and any potential impacts would be temporary and short-term. The implementation of the mitigation measures provided in section 7.3.5 would further reduce the potential significance of any impacts.

### ***Potential for building damage – general buildings***

The assessment concludes that the predicted magnitude of ground vibrations would not be sufficient to cause damage to any buildings located further than 13 m from the proposal. Some buildings/structures are located within 13 m of the potential work areas. The contractor would undertake dilapidation surveys and compliance vibration monitoring for all commercial buildings located within 13 m of compaction equipment. Vibration mitigation measures would also be implemented to minimise the amount of vibration generated.

### ***Potential for building damage – heritage listed buildings and structures***

The building damage vibration criteria for heritage listed buildings are more stringent. Vibration generated by construction may exceed the building damage criteria during vibration intensive activities (particularly any percussive activities) at the heritage listed wall and Sydney terminal and yards. As the heritage walls are located close to piling activities, there is a risk of vibration impacts to these walls. The nature of these impacts is currently unknown as the preferred construction method (particularly in relation to piling) would be determined by the selected contractor. Monitoring would be undertaken in the vicinity of heritage structures. Should vibration levels be deemed to be above the relevant criteria, alternate construction methods (with lower vibration impacts) would be considered and implemented.

Mitigation measures provided in section 7.3.5 would be implemented to minimise the potential for impacts to these items.

**Table 7.9 Predicted construction noise levels**

Receiver	Standard hours criteria	Site clearing and demolition (dB(A))		Earthworks (dB(A))		Construction works (dB(A))	
		Ground floor	First floor	Ground floor	First floor	Ground floor	First floor
R1: 12-26 Regent St	64	72 (+8)	68 (+4)	64 (0)	66 (+2)	67 (+3)	69 (+5)
R2: 27-31 Regent St	64	54 (-10)	47 (-17)	43 (-21)	44 (-20)	47 (-17)	47 (-17)
R3: 14-18 Lee St	64	55 (-9)	51 (-13)	47 (-17)	48 (-16)	51 (-13)	52 (-12)
R4: 15-17 Regent St	64	49 (-15)	44 (-20)	40 (-24)	41 (-23)	44 (-20)	45 (-19)
R5: 18 Lee St	64	52 (-12)	48 (-16)	43 (-21)	44 (-20)	48 (-16)	48 (-16)
R6: 32-34 Regent St	64	76 (+12)	73 (+9)	69 (+5)	71 (+7)	72 (+8)	74 (+10)
R7: 49-53 Regent St	64	70 (+6)	66 (+2)	61 (-3)	65 (+1)	64 (0)	67 (+3)
R8: 55 Regent St	64	68 (+4)	63 (-1)	58 (-6)	63 (-1)	62 (-2)	65 (+1)
R9: 822 George St	64	69 (+5)	65 (1)	59 (-5)	64 (0)	63 (-1)	66 (+2)
R10: 824-826 George St	64	52 (-12)	43 (-21)	39 (-25)	40 (-24)	43 (-21)	44 (-20)
R11: Goold St Residences	64	50 (-14)	42 (-22)	38 (-26)	39 (-25)	42 (-22)	43 (-21)
R12: Casa Central Accommodation	64	49 (-15)	43 (-21)	39 (-25)	39 (-25)	43 (-21)	43 (-21)
R13: Leisure Inn Sydney Central	64	74 (+10)	70 (+6)	67 (+3)	68 (+4)	70 (+6)	71 (+7)
R14: Mercure Hotel Sydney on Broadway	64	73 (+9)	70 (+6)	66 (+2)	68 (+4)	69 (+5)	70 (+6)
R15: AEA Central serviced apartments	64	66 (+2)	61 (-3)	56 (-8)	61 (-3)	59 (-5)	62 (-2)
R16: Iglu Student Accommodation	64	49 (-15)	42 (-22)	38 (-26)	39 (-25)	42 (-22)	43 (-21)
R17: Curtin University Sydney	45 internal (60 external)	71 (+11)	60 (0)	56 (-4)	59 (-1)	58 (-2)	61 (+1)
R18: YMCA Sydney	65	71 (+6)	67 (+2)	64 (-1)	66 (+1)	67 (+2)	68 (+3)
R19: Pack & Send Surry Hills	75	54 (-21)	47 (-28)	43 (-32)	44 (-31)	47 (-28)	47 (-28)

Receiver	Standard hours criteria	Site clearing and demolition (dB(A))		Earthworks (dB(A))		Construction works (dB(A))	
		Ground floor	First floor	Ground floor	First floor	Ground floor	First floor
R20: Gateway House	75	<b>79 (+4)</b>	<b>77 (+2)</b>	72 (-3)	73 (-2)	<b>76 (+1)</b>	<b>77 (+2)</b>
R21: Clinic 36	75	75 (0)	71 (-4)	68 (-7)	70 (-5)	71 (-4)	72 (-3)
R22: NSW Registry of Births, Deaths & Marriages	75	71 (-4)	57 (-18)	49 (-26)	54 (-21)	53 (-22)	58 (-17)
R23: Pho Ngon Restaurant	75	47 (-28)	44 (-31)	39 (-36)	39 (-36)	44 (-31)	44 (-31)

Note 1: **Bold font** indicates exceedances of the noise affected construction noise management levels

2: **Bold red** indicates exceedances of the highly noise affected construction noise management levels

3. **Bold green** indicates compliance with criteria

## Operation

### Noise

The results of the assessment (refer Table 7.10) indicate that the predicted noise levels as a result of operating the transformers and rectifiers at full load would not exceed the noise criteria at nearby residential dwellings. As a result, no operational impacts are expected.

Tripping of the circuit breakers is not expected to result in the sleep disturbance criteria being exceeded (refer Table 7.11). Any potential impacts would be further reduced by the fact that such events are infrequent (approximately three per year) and therefore are unlikely to adversely impact any surrounding residences.

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

**Table 7.10 Predicted noise levels during normal operations**

Receiver	Operational criteria $L_{Aeq(night)}$ (dBA)	Predicted noise levels $L_{Aeq(night)}$ (dB(A))		
		Receiver height		
		1.5 m	4.5 m	7.5 m
R1: 12-26 Regent St	45	38 (-7)	38 (-7)	36 (-9)
R2: 27-31 Regent St	45	19 (-26)	19 (-26)	24 (-21)
R3: 14-18 Lee St	45	20 (-25)	21 (-24)	22 (-23)
R4: 15-17 Regent St	45	16 (-29)	16 (-29)	19 (-26)
R5: 18 Lee St	45	17 (-28)	17 (-28)	17 (-28)
R6: 32-34 Regent St	45	45 (0)	45 (0)	44 (-1)
R7: 49-53 Regent St	45	42 (-3)	42 (-3)	40 (-6)
R8: 55 Regent St	45	40 (-6)	40 (-6)	37 (-8)
R9: 822 George St	45	34 (-11)	34 (-11)	33 (-12)
R10: 824-826 George St	45	14 (-31)	15 (-30)	16 (-29)
R11: Goold St Residences	45	15 (-30)	16 (-30)	16 (-29)
R12: Casa Central Accommodation	45	14 (-31)	14 (-31)	16 (-29)
R13: Leisure Inn Sydney Central	45	42 (-3)	41 (-4)	40 (-5)
R14: Mercure Hotel Sydney on Broadway	45	38 (-8)	38 (-8)	37 (-8)
R15: AEA Central serviced apartments	45	37 (-8)	37 (-8)	34 (-11)
R16: Iglu Student Accommodation	45	13 (-32)	14 (-31)	15 (-30)
R17: Curtin University Sydney	45	34 (-11)	36 (-9)	39 (-7)
R18: YMCA Sydney	55	44 (-12)	44 (-12)	41 (-14)
R19: Pack & Send Surry Hills	65	19 (-46)	19 (-46)	24 (-41)
R20: Gateway House	65	39 (-26)	40 (-25)	43 (-22)
R21: Clinic 36	65	47 (-18)	47 (-18)	45 (-20)

Receiver	Operational criteria $L_{Aeq(night)}$ (dBA)	Predicted noise levels $L_{Aeq(night)}$ (dB(A))		
		Receiver height		
		1.5 m	4.5 m	7.5 m
R22: NSW Registry of Births, Deaths & Marriages	65	30 <b>(-35)</b>	35 <b>(-30)</b>	38 <b>(-27)</b>
R23: Pho Ngon Restaurant	65	13 <b>(-52)</b>	13 <b>(-52)</b>	14 <b>(-51)</b>

Note: 1. **Bold green** indicates compliance with criteria

**Table 7.11 Predicted noise levels during circuit breaker tripping**

Receiver	Sleep disturbance criteria $L_{Amax}$ (dB(A))	Predicted noise levels (dB(A))		
		Receiver height		
		1.5 m	4.5 m	7.5 m
R1: 12-26 Regent St	61	57 <b>(-4)</b>	58 <b>(-13)</b>	58 <b>(-13)</b>
R2: 27-31 Regent St	61	41 <b>(-21)</b>	41 <b>(-30)</b>	41 <b>(-30)</b>
R3: 14-18 Lee St	61	44 <b>(-17)</b>	44 <b>(-17)</b>	44 <b>(-17)</b>
R4: 15-17 Regent St	61	39 <b>(-22)</b>	39 <b>(-22)</b>	39 <b>(-22)</b>
R5: 18 Lee St	61	45 <b>(-16)</b>	45 <b>(-16)</b>	45 <b>(-16)</b>
R6: 32-34 Regent St	61	53 <b>(-8)</b>	54 <b>(-7)</b>	54 <b>(-7)</b>
R7: 49-53 Regent St	61	51 <b>(-10)</b>	51 <b>(-20)</b>	51 <b>(-10)</b>
R8: 55 Regent St	61	47 <b>(-14)</b>	49 <b>(-12)</b>	49 <b>(-12)</b>
R9: 822 George St	61	47 <b>(-14)</b>	47 <b>(-14)</b>	47 <b>(-14)</b>
R10: 824-826 George St	61	37 <b>(-24)</b>	37 <b>(-24)</b>	37 <b>(-24)</b>
R11: Goold St Residences	61	38 <b>(-23)</b>	39 <b>(-22)</b>	39 <b>(-22)</b>
R12: Casa Central Accommodation	61	37 <b>(-24)</b>	37 <b>(-24)</b>	37 <b>(-24)</b>
R13: Leisure Inn Sydney Central	61	58 <b>(-3)</b>	59 <b>(-3)</b>	59 <b>(-3)</b>
R14: Mercure Hotel Sydney on Broadway	61	56 <b>(-5)</b>	56 <b>(-5)</b>	56 <b>(-5)</b>
R15: AEA Central serviced apartments	61	46 <b>(-15)</b>	48 <b>(-13)</b>	48 <b>(-13)</b>
R16: Iglu Student Accommodation	61	37 <b>(-25)</b>	37 <b>(-24)</b>	37 <b>(-24)</b>

Note: 1. **Bold green** indicates compliance with criteria

### Vibration

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

### 7.3.5 Mitigation measures

#### Construction noise

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

- 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). It would include the following measures.

- Mitigation measures documented in *Construction Noise Strategy* (Transport for NSW, 2012) would be adopted where feasible and reasonable, as specified in Table 6-1 and 6-2 of Appendix D.
- 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 of 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:
  - avoid the use of outdoor radios during the night period
  - avoid 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) would be used by construction vehicles and plant regularly used on site (ie greater than one day).
- 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.
- 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 hours works to be undertaken in accordance with the *Construction Noise Strategy* (Transport for NSW, 2012).
- For activities outside the recommended standard hours, noise monitoring and letter box drops would be undertaken at residences and other non-residential receivers where noise levels are clearly audible.
- 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.

### **Construction vibration**

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

- Sensitive receivers within the safe working distance buffers would be informed of the nature of the works, duration and provided with contact details.
- A dilapidation survey would be prepared for all heritage buildings and structures located within 13 m of construction involving vibration intensive compaction equipment.

- Compliance vibration monitoring would be undertaken during operation of any vibration intensive construction equipment to ensure compliance with the building damage criteria for heritage buildings or structures.
- A trigger alarm system would be implemented to notify site personnel in the event that vibration limits are close to being exceeded.
- Provide alternative equipment or construction methodologies where feasible and reasonable to minimise vibration impacts.

## Operation

The following mitigation measures would be implemented to minimise impacts on noise and vibration during operation:

- Any noise complaints would be investigated in accordance with Sydney Train's standard operational procedures.

## 7.4 Flora and fauna

### 7.4.1 Existing environment

A desktop assessment, involving searches of relevant databases, was undertaken to determine the potential conservation significance of the study area, and to identify the likelihood that any threatened flora and fauna species, populations and ecological communities would be present in the study area and proposal site. The results of the desktop assessment are provided in Appendix E.

The results of the desktop assessment were confirmed by a site inspection undertaken by a GHD ecologist on 6 November 2013. The purpose of this inspection was to identify whether any native vegetation or potential habitat (for threatened or migratory biota listed under the TSC and/or EPBC Acts) was present on or near the proposal site.

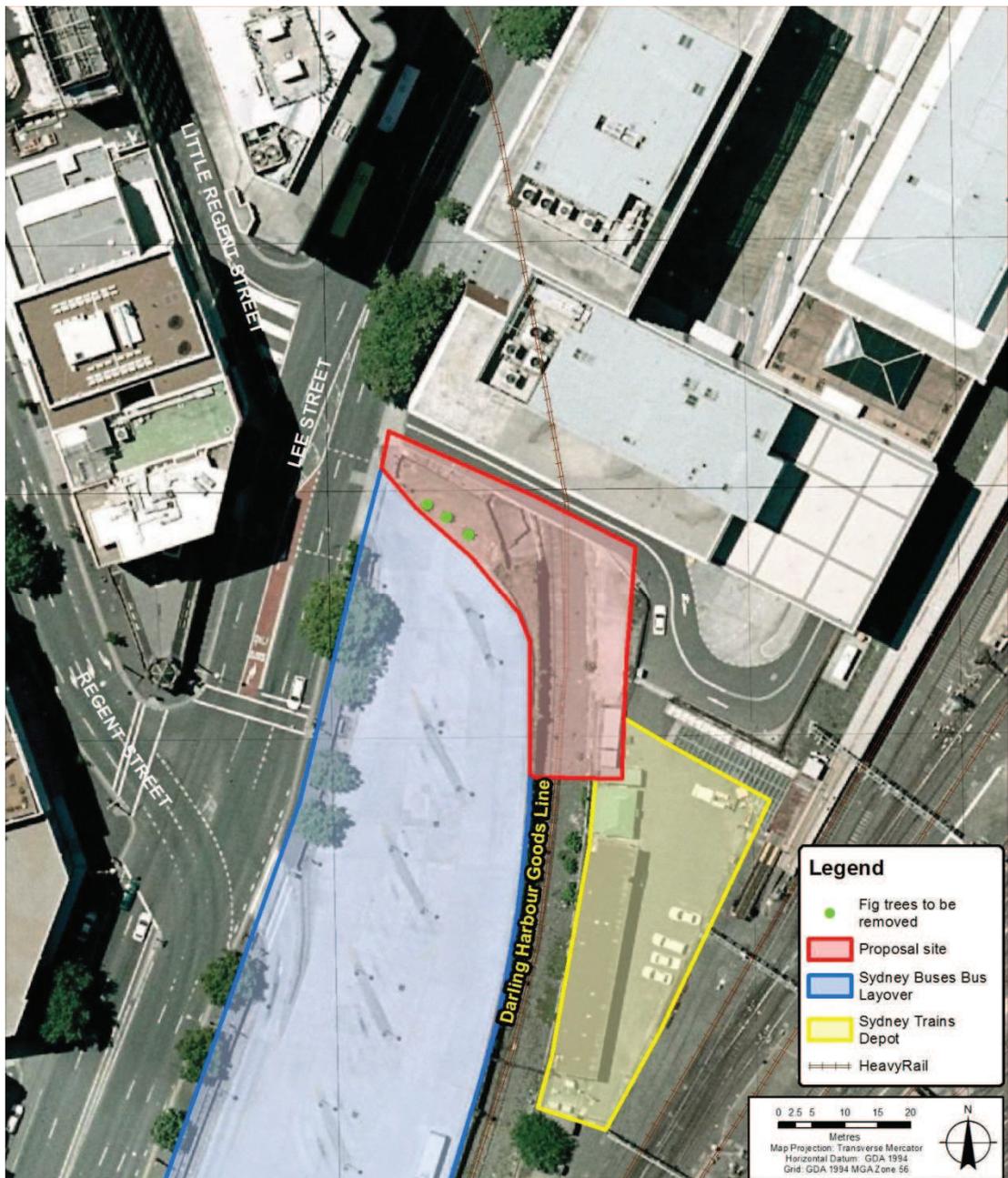
The proposal site is a highly modified area within an urban environment. The majority of the groundcover is hardstand (concrete or asphalt) and no native soil is likely to be present. A range of weed species were identified, including Crofton Weed (*Ageratina adenophora*), Morning Glory (*Ipomoea indica*), Pellitory (*Parietaria judaica*) and Paspalum (*Paspalum dilatatum*). Pellitory is listed as a Class 4 noxious weed by Council.

Three small, planted decorative figs (*Ficus* sp.) are present in the western component of the proposal site (location shown in Figure 7.3, while Figure 2.2 includes a photo of the figs in context with the open space area on the proposal site). No native vegetation communities are present on site. Given the lack of native vegetation and natural soils, no threatened ecological communities or threatened flora species are present or are likely to occur.

The site does not contain any habitat of importance for native fauna species. No native plants were identified. The figs would provide occasional resting habitat for common native birds (such as the Noisy Miner *Manorina melanocephala*) and feral birds (such as the Rock Dove *Columba livia*). No threatened or migratory fauna species are likely to occur, with the figs not being mature enough to provide suitable habitat for flying foxes.

The Goods Line tunnel would potentially provide roosting habitat for microbats, however it is not considered likely that it would provide breeding habitat for any species.

An existing garden bed is located to the north of the proposal site adjacent to the access road to the Sydney Trains Depot and 26 Lee Street. This garden bed is not located on land on which the proposal is located. This garden consists of a number of ornamented species with woodchips covering the garden bed.



**Figure 7.3 Location of three fig trees on site**

#### 7.4.2 Impact assessment

There would be no impact on any intact or naturally occurring native vegetation as a result of the proposal. The proposal would not impact any threatened ecological communities or threatened plants. Only planted ornamentals and weeds would be removed, including the three planted decorative figs.

The proposal would not impact on any native fauna species, threatened or migratory biota. There would be no direct impacts on any potential roosting microbats within the Goods Line tunnel. In the event indirect impacts such as noise occur, bats using the Goods Line tunnel as roosting habitat are considered likely to relocate to a more suitable location, of which is readily available in the surrounding landscape.

No assessments of significance are required for threatened species listed under the TSC Act and a Species Impact Statement is not required. No assessments of significance are required

for threatened or migratory biota listed under the EPBC Act, and the proposal does not need to be referred to the Minister for the Environment based on ecological grounds.

The proposal would result in impacts on the garden bed located to the north of the proposal site (adjacent access road to Sydney Trains Depot and 26 Lee Street), these impacts would be short term during the construction a new wall in this location. The garden would be reinstated following construction in consultation with the land owner.

### **7.4.3 Mitigation measures**

The measures provided below would be implemented to minimise the spread of noxious weeds:

- 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*.

## **7.5 Traffic and transport**

### **7.5.1 Existing environment**

The road network in the vicinity of the proposal is shown in Figure 1.1 and summarised below.

#### **Lee Street**

The proposal site is located to the east of Lee Street. Lee Street is a classified road (part of Main Road 170) which extends from the George Street/Pitt Street intersection in the north, to Regent Street in the south. In the vicinity of the proposal site, Lee Street has four lanes (two in each direction). The most recent traffic counts available indicate that, in 2005, Lee Street had a vehicle count of 22,608 vehicles per day.

#### **Public transport**

Lee Street forms part of the Railway Square bus interchange area, and a large number of buses use the road. Land to the south of the proposal site is operated by the State Transit Authority as a bus layover area. The entrance to this layover area is located just to the south of the proposal site; however vehicles exit the layover area at the Regent Street/Lee Street intersection.

#### **Access to surrounding land uses**

To the north of the proposal site is an access road which provides access to the car parking area below 26 Lee Street (Gateway House) and also to the Sydney Trains depot located on the eastern side of the Goods Line.

### **7.5.2 Impact assessment**

#### **Construction**

Information regarding the proposed arrangements in terms of construction site access, parking and vehicle movements is provided in section 5.2.4.

#### **Vehicle movements**

Construction vehicle movements would result in a temporary increase in traffic along the road network in the study area. An estimate of the likely construction traffic generation is provided in section 5.2.4. The construction traffic that would be generated by the proposal (up to a maximum of approximately 44 vehicle movements per day) would be a very small proportion of the existing traffic levels on Lee Street and surrounding streets. This increase is not expected to result in any impacts on the operation of the road network.

### ***Oversized deliveries***

The construction of the proposal would require delivery of oversized pieces of equipment and materials, such as transformers, rectifiers and pre-cast panels. These deliveries would be undertaken in consultation with relevant agencies and in line with the traffic management plans to be developed as part of the CEMP. Such deliveries would generally be undertaken out of hours to minimise the potential for impacts to the surrounding road network.

### ***Site access and operation of the bus layover site***

Access to the proposal site would be via the bus layover area off Lee Street, using the existing access to the layover site.

As noted in section 5.2.4, cranes may be required to deliver materials and equipment to the proposal site. The positioning of the cranes would need to be confirmed by the construction contractor. The bus layover area is being considered as one potential location for a temporary crane. Following consultation with the State Transit Authority to determine the potential area to be used and the timing of the crane, the potential impacts are considered to be manageable. Access arrangements would be finalised in consultation with the State Transit Authority and site staff to minimise potential impacts on the operation of the bus layover area.

Access to 26 Lee Street and the Sydney Trains Depot would be maintained at all times. Access to the Great Southern Rail car loader would be maintained on the days it is used (Wednesdays and Saturdays).

### ***Pedestrian impacts***

Access along Lee Street would be maintained at all times.

### ***Services relocation***

The proposal would potentially require the relocation of some services located within the footpath and roadway of Lee Street. These works would have the potential to impact on the operation of the road and footpath. To minimise the potential impacts, the works would be undertaken over a short period of time and in consultation with RMS (as the owner of the road). Overall impacts on traffic and pedestrian movements would be minimal as a result of the short duration and localised nature of the works.

### **Operation**

As noted in section 5.1.4, vehicular access to the proposal site would be via Lee Street, with a new secure access gate provided. The site entrance would be positioned between the accesses to the bus layover area and 26 Lee Street/Sydney Trains Depot. Parking for one vehicle would be provided on site.

Operation of the proposal would not result in any impacts to traffic or access, as access for maintenance purposes would be infrequent (approximately two per month).

As noted in section 3.3.1, the proposal would require consent from NSW Roads and Maritime Services under section 138 of the *Roads Act 1993*.

## **7.5.3 Mitigation measures**

### **Construction**

The following mitigation measures would be implemented during construction:

- A traffic management sub-plan would be prepared as part of the CEMP.

- Traffic and access would be managed in accordance with *Traffic Control at Work Sites* (RTA, 2010) and in consultation with Roads and Maritime Services and City of Sydney Council.
- Residents, property owners and operators would be notified of any access restrictions in advance of work commencing. Site access and work scheduling arrangements would be finalised in consultation with the owners and operators of adjoining sites, including the bus layover area, to minimise the potential impacts on the operation of, and access to, these sites.
- Appropriate traffic management 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 work areas from the adjacent road network 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.
- 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 specified routes.
- Oversized deliveries would be undertaken in accordance with the requirements of Roads and Maritime Services and NSW Police.
- Workers would be encouraged to access the proposal site via public transport.

## Operation

No mitigation measures are required.

## 7.6 Air quality

### 7.6.1 Existing environment

A search of the National Pollutant Inventory undertaken on 20 November 2013 identified 29 air pollutant substances from five sources in the City of Sydney LGA, for the 2011 to 2012 reporting period. The closest identified source of air pollutant is a commercial facility (Ensign Services Commercial Laundry, Rosebery) located about 3 km south of the proposal site.

The main contributors to air quality within the study area are emissions from motor vehicles on the surrounding road network, and the operation of diesel train services on the adjoining rail corridor.

The nearest sensitive receivers are the residential properties on the western side of Lee Street approximately 25 m to the west.

### 7.6.2 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 minor excavation associated with piling, and the movement of construction vehicles.

Dust impacts have the potential to 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.

The operation of plant, machinery and trucks may also lead to increases in exhaust emissions in the study area; however these impacts would be minor and short term.

Implementation of standard air quality management controls (listed in section 7.6.3) would minimise the potential for air quality impacts.

## **Operation**

### ***Air quality***

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

### ***Greenhouse gases***

Sulfur hexafluoride gas (SF<sub>6</sub>) would be used as an insulator within the new switchgear at the Lee Street Substation. SF<sub>6</sub> 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. SF<sub>6</sub> is sealed within gas-tight compartments inside the switchgear. Leakage of SF<sub>6</sub> could occur during maintenance activities or through poor work practices. This would be managed by the mitigation measures proposed in section 7.6.3.

## **7.6.3 Mitigation measures**

### **Construction**

The following mitigation measures would be implemented to minimise impacts on air quality during 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 RMS 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.
  - Stabilisation of any excavated areas as soon as practicable.
  - 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 construction compound to minimise dust transported from the site during construction.

## Operation

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

- Maintenance of switchgear and management of SF<sub>6</sub> would be undertaken in accordance with Sydney Trains existing management procedures.

## 7.7 Land use, social and visual environment

### 7.7.1 Existing environment

#### Land use

The existing land uses of the site and surrounds are described in sections 2.1 and 2.2.

The majority of the proposal site is located above the Goods Line. The western side of the site is located within a small area of open space which forms part of the rail corridor.

Land to the east of the site is dominated by railway uses associated with Central, while land to the west of the site generally consists of a mixture of residential and commercial uses.

The main adjoining land uses are the bus layover area, commercial office buildings and rail corridor.

#### Visual landscape

The proposal site is located on the western edge of the Central Station railway precinct, with the visual landscape to the east of the site dominated by railway infrastructure. Views of the site are readily available from land uses to the north and west, as they are mostly elevated above the site (for example, from multiple storey buildings). Views from these receivers are currently dominated by railway infrastructure and other infrastructure such as the bus layover area. Various heritage items and elements of the Central Station site/group (described in section 7.1.2) also contribute to the visual landscape of the proposal site.

#### Socio-economic environment

The community in the study area consists of residents and workers in residential apartment buildings, the bus layover area, commercial buildings and rail workers. Business operations include those undertaken in the commercial buildings, as well as the operation of the bus layover area and rail corridor.

### 7.7.2 Impact assessment

#### Construction

##### *Land use*

The proposal would not impact upon land uses. As the substation would be constructed mainly above the Goods Line and would use an area of open space associated with the rail corridor, the potential for direct impacts to land use are minimal. The proposal would not impact upon the use of the Goods Line should it be put into service again.

##### *Amenity impacts*

The proposal has the potential to result in some indirect 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 include noise, traffic and access, air quality, and visual impacts, and are assessed in sections 7.3, 7.5, 7.6 and below respectively.

### **Visual impacts**

During construction, the positioning of the work site and the site compound/s would result in some short term impacts on the visual amenity for properties located in close proximity to the site.

Overall, the potential visual impacts of construction activities are considered to be minimal as the works would be temporary and short term. Potential impacts would be managed by the implementation of measures provided in section 7.7.3.

There is potential for night works to be required for the proposal. During night works, the erection of lighting would be required to ensure a safe working environment. Impacts of night works are considered to be minimal as they would be infrequent and any lighting would be directed away from neighbouring properties.

### **Operation**

The operation of the substation would not result in any impacts on land use, as it would involve use of existing rail land for rail purposes.

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. The new structure would be consistent with the existing visual environment, which is dominated by rail infrastructure and other multi-storey buildings. To minimise the potential heritage impacts, the proposal would incorporate a brick facade consistent with nearby buildings which contribute to the overall heritage listing for the Central Station site/group. Figure 7.4 shows the scale of the proposal in relation to the surrounding buildings.

The substation has been designed to integrate all relevant considerations, including urban design and visual considerations. Further design phases would continue to consider the potential for visual impacts.

The Statement of Heritage Impact considered the potential for impacts to views of heritage items and elements in the vicinity of the proposal site (refer section 7.1 and Appendix C). No significant impacts were identified.

## **7.7.3 Mitigation measures**

### **Construction**

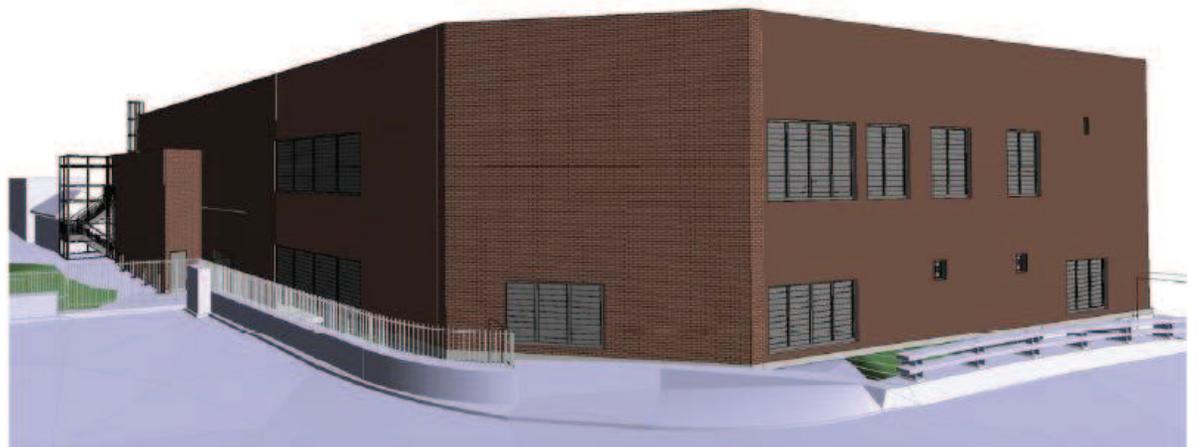
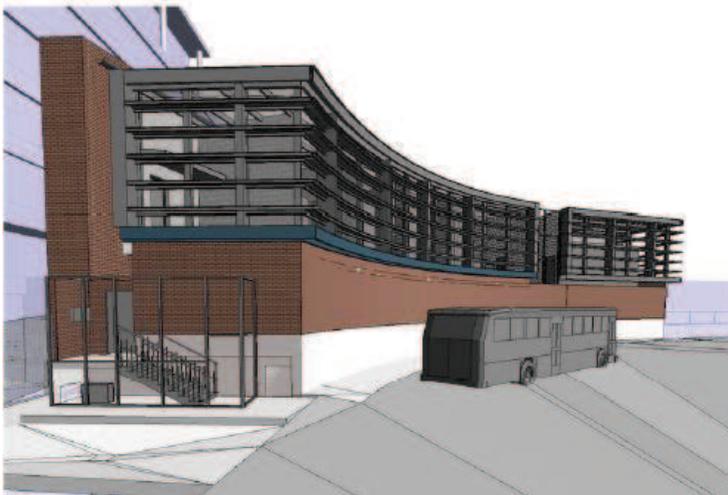
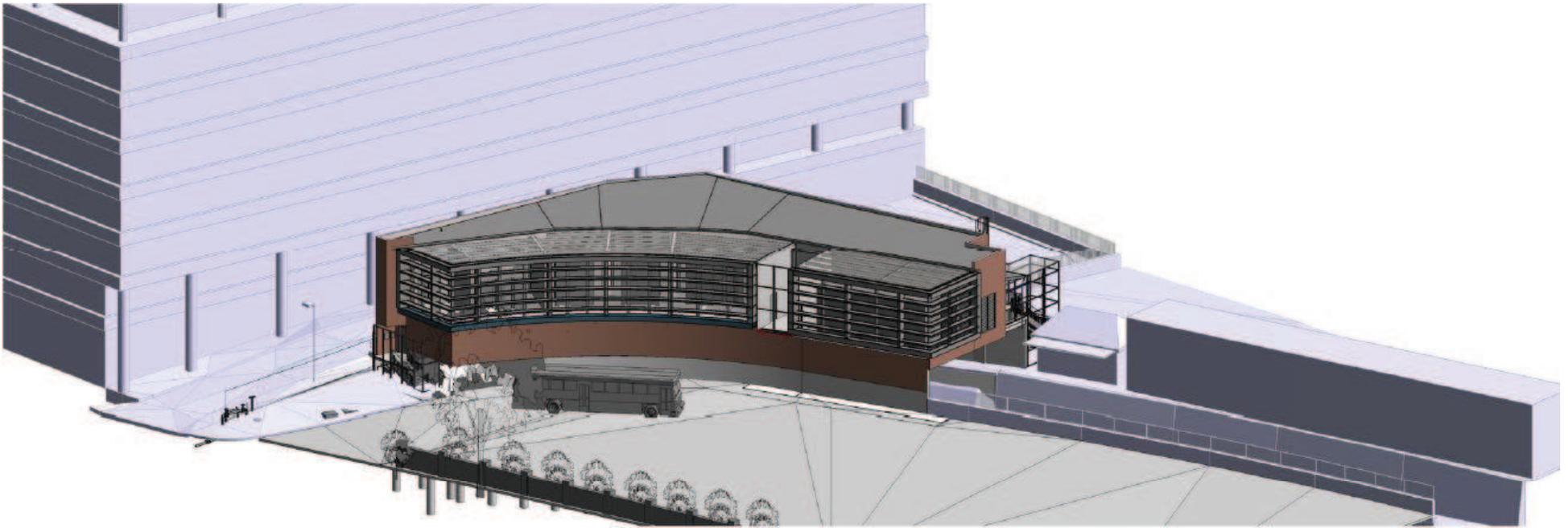
The following mitigation measures would be implemented to minimise impacts during construction:

- 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.
- Directional lighting would be mounted to avoid light spill into adjoining residential buildings during any night works, particularly during the rail shutdown periods.

### **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.



**Figure 7.4 Concept drawings of the proposal in relation to surrounding landscape**

## 7.8 Electromagnetic energy

An electromagnetic energy report for the proposal was undertaken by EMC Services Pty Ltd in November 2013. The results of this assessment are summarised below. The full assessment report is provided in Appendix F.

### 7.8.1 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 (1,500 V) 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 has been undertaken by EMC Services. This assessment found that the strongest magnetic field outside the substation building is predicted to occur outside the banded transformer yard at the bus layover area. The strengths of the electromagnetic fields in this location (8 microtesla at the boundary of the substation) are predicted to be below the permissible exposure limit of 100 microtesla for exposure to the public. The levels within the substation are also below the acceptable limits, however these areas would only be accessed by appropriately qualified persons.

Without accounting for shielding within the substation, when the substation is fully loaded, the RF electric fields within 100 m of the substation would not exceed the applicable limit for urban broadcast reception. Within 100 m of the substation, radio receptions would be impacted, especially for AM reception and HF frequency bands. These levels would be reduced somewhat once shielding from the substation building is factored in. 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.

## **7.8.2 Mitigation measures**

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

- During commissioning of the substation, 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.
- In the event exclusion zones around equipment cannot be provided, magnetic shielding would be considered.

## **7.9 Aboriginal heritage**

### **7.9.1 Existing environment**

A search of the Aboriginal Heritage Information Management System was undertaken on 12 November 2013 for Lot 118 DP1078271. This search identified that there are no known Aboriginal heritage items located within this lot.

### **7.9.2 Impact assessment**

As the study area has been substantially modified by urban development and subject to previous ground disturbance, the risk of encountering any unknown Aboriginal heritage items is considered to be extremely low.

### **7.9.3 Mitigation measures**

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

- Should Aboriginal heritage items be uncovered all work in the vicinity will cease and the Project Manager and Transport for NSW staff will be notified immediately. OEH will be notified in accordance with the *National Parks and Wildlife Act 1979*. The local Aboriginal Land Council will be notified and an assessment by an archaeologist will be arranged to determine the significance of the objects and any other requirements before work resumes.

## **7.10 Waste**

### **7.10.1 Waste generation**

#### **Construction**

Waste generated during construction phase would be limited to surplus building materials, such as concrete, brick, and cladding, and spoil from excavations required on site. 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 this building means that a small volume of waste in comparison to other larger infrastructure construction projects is likely to be generated as a result of surplus materials. There would be some excess spoil as a result of piling works and also from the construction of the cable route through micro tunnelling or under boring methods. The amount of excess spoil generated by the proposal is considered to be minimal.

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

All wastes would be collected and stored on-site prior to disposal in accordance with DECC *Waste Classification Guidelines* (2009). Where possible, this material would be reused or recycled in preference to disposal.

### Operation

The only waste generated during operation would be related to periodic maintenance. 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* (DECCW, 2009).

## 7.10.2 Mitigation measures

### Construction

The following mitigation measures would be implemented during construction:

- Wastes generated by the proposal would be managed in accordance with the *Waste Classification Guidelines* (DECCW, 2009) 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.

### Operation

No mitigation measures are required.

## 7.11 Cumulative impacts

### 7.11.1 Existing or potential projects

A number of projects are being undertaken in the vicinity of the proposal by Transport for NSW and Sydney Trains, including:

- Sydney Yard Overhead Wiring Modernisation Project
- Sydney Yard Substation Project
- Sydney to Burwood Compressor Houses Project
- Prince Alfred Sidings Super Depot.

The following projects are also being undertaken in the study area:

- CBD and South East Light Rail Project
- Central Park, Chippendale (former Carlton United Breweries site)
- University of Technology Sydney.

The Chalmers Street Substation would also be constructed at a similar time as the proposal.

### 7.11.2 Impact assessment

A number of large scale developments are currently underway or would potentially occur during the construction phase of the proposal. A number of these projects (such as Sydney to Burwood Compressor Houses project and the Prince Alfred Sidings Super Depot project) are located on the opposite side of the rail corridor. Therefore the potential for cumulative impacts is

considered to be minimal due to the separation from the Lee Street Substation site. Compared to the above projects, the proposal is considered to be relatively small scale and therefore would not contribute significantly to any cumulative impacts. As potential impacts associated with the proposal would be short term and impacts would be localised, the potential for significant cumulative impacts is considered to be minimal, and would relate mainly to the impacts of construction traffic on the surrounding road network.

The construction of the Lee Street and Chalmers Street substations is considered unlikely to result in any cumulative impacts as they are located on opposite sides of the Sydney Yards.

The operation of the new substations would not result in any significant cumulative EME impacts. Individually, the substations would not result in any EME impacts, and the distance between the two substations would minimise the potential for any cumulative impacts to occur.

The potential for cumulative heritage impacts has also been considered. As the proposal would result in minimal impacts to heritage, it is unlikely to contribute to any cumulative impacts to the heritage value of the Central Station site/group.

### **7.11.3 Mitigation measures**

#### **Construction**

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

- Transport for NSW and/or the construction contractor would consult with the proponents of any major developments in the vicinity of the proposal site to address any potential cumulative impacts.

#### **Operation**

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 (such as approvals under the Heritage Act). The plan would address (at a minimum) the following elements:

- traffic and transport management
- heritage management
- noise and vibration management
- water and soil management
- air quality 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. Operational measures have only been included here where relevant.

**Table 8.1 Mitigation measures**

Issue	Mitigation measure
Non-Aboriginal	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• Creation of a photographic archival recording of the site prior to construction, in particular the Darling Harbour cutting in the vicinity of the proposal.</li> <li>• Development and implementation of a Heritage Interpretation Strategy for the Western Yard as a whole with reference to the identified items of significance within it, notably the Ultimo Overbridge and Darling Harbour Cut, in consultation with all relevant stakeholders including Sydney Trains and Transport for NSW. Elements of such a strategy should include interpretive signage and online material among other means.</li> <li>• Exploration of any current or future options for public pedestrian and bicycle access from Mortuary Station to and through the Darling Harbour Cutting and the Ultimo Overbridge, for example connecting to the current Goods Line project.</li> <li>• Removal of vegetation from along the Cutting in order to investigate and confirm location and condition of items mentioned in the CSCMP, viz., the 1857 sewer, the oviform drain, etc.</li> <li>• All heritage items in the immediate vicinity of the proposal site would be marked on site plans, fenced off where appropriate, and avoided.</li> <li>• Dilapidation surveys would be undertaken for heritage buildings located in the immediate vicinity of the proposal.</li> <li>• The sandstone wall located on the eastern side of the cutting would need to be protected. The following activities would be undertaken to protect the wall: <ul style="list-style-type: none"> <li>– Carry out survey of the wall and fence showing positioning of all stones drawn unto their joints in plan and elevation, and the position of fence palisades including major supports. An allowance would be made for repair of the sandstone wall, especially the plinths stones, which show signs of case hardening, delamination and salt attack. The existing pointing would be removed and repointed.</li> <li>– Cut required sections of fence palisades at 300 mm above plinth stone level.</li> <li>– Provide framed and braced timber hoarding over the wall to box in</li> </ul> </li> </ul>

Issue	Mitigation measure
	<p>top and both vertical faces lines with solid plywood (15 ply) making sure that a solid protective base is provided that enables construction access during works.</p> <ul style="list-style-type: none"> <li>– Following completion of the works, the fence would be re-welded in the same position by a wrought iron repair specialist, taking care to ensure that following welding, each joint is ground smooth so that the joint cannot be seen.</li> <li>– A nominated heritage architect would inspect the wall and fence prior to and immediately after construction. The architect would also preside over de-pointing and re-pointing of sandstone block wall and the welding of the palisade fencing.</li> </ul> <ul style="list-style-type: none"> <li>• The western retaining wall and associated fence would be protected with the use of hoarding to minimise accidental damage from construction works.</li> <li>• The western retaining wall would be monitored during construction to ensure it is not impacted.</li> <li>• For works in the vicinity of both the western and eastern walls, work methods and equipment would be carefully selected to minimise any impacts on the walls in particular any vibration impacts.</li> <li>• If any unanticipated archaeological deposits are identified within the proposal site during construction, work likely to impact on the deposit would cease immediately and the NSW Heritage Council and an archaeologist would be contacted. Where required, further archaeological work and/or consents would be obtained prior to works recommencing at the location.</li> </ul> <p><i>Operation</i></p> <ul style="list-style-type: none"> <li>• The design of the proposal would be finalised in accordance with the Central Station Conservation Management Plan, the heritage significance of the surrounding area and the findings of the Statement of Heritage Impact.</li> <li>• The materials selected would be sympathetic to the surrounding heritage items/elements, while also clearly marking the building as contemporary.</li> </ul>
Soils and water quality	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• Sediment and erosion control devices would be installed to minimise transport of sediment in accordance with Managing Urban Stormwater, Soils &amp; Construction, Volume 1 (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.</li> <li>• Temporary stormwater control devices or erosion and sedimentation controls would be implemented at stormwater drains to prevent sediment-laden runoff entering the local stormwater system.</li> <li>• Maintenance and checking of the erosion and sedimentation controls would be undertaken on a regular basis and records kept. Sediment</li> </ul>

Issue	Mitigation measure
	<p>would be cleared from behind barriers/sand bags on a regular basis and all controls would be managed to ensure they work effectively at all times.</p> <ul style="list-style-type: none"> <li>• Any material transported onto pavement surfaces would be swept and removed at the end of each working day when it is safe to do so.</li> <li>• Any soils excavated that are to be used as backfill would be appropriately stored until required.</li> <li>• Disturbed areas would be restored at the completion of works.</li> <li>• Spill kits would be maintained on site at all times.</li> <li>• Machinery would be checked daily to ensure that no oil, fuel or other liquids are leaking.</li> <li>• Refuelling of plant and equipment would not be undertaken within the proposal site.</li> <li>• All water discharges would be undertaken in accordance with Transport for NSW's <i>Water Discharge and Re-use Guideline</i> (2012).</li> <li>• The existing drainage systems would remain operational during construction.</li> <li>• Clean water would be diverted around the worksite in accordance with <i>Managing Urban Stormwater: Soils and Construction</i>.</li> <li>• An unexpected findings 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.</li> <li>• 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 environmental consultant can advise on the need for remediation or other action.</li> <li>• Should groundwater be encountered during construction activities, appropriate management measures such as water testing, dewatering, temporary water storage and treatment facilities would be implemented to manage any groundwater that seeps into excavations.</li> </ul>
Noise and vibration	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• A noise and vibration management plan would be prepared as part of the CEMP in accordance with the <i>Construction Noise Strategy</i> (Transport for NSW, 2012). It would include the following measures.</li> <li>• Mitigation measures documented in <i>Construction Noise Strategy</i> (Transport for NSW, 2012) would be adopted where feasible and reasonable, as specified in Table 6-1 and 6-2 of Appendix D.</li> <li>• Sensitive receivers would be identified and marked on plans.</li> <li>• Works would be scheduled during recommended standard hours where practicable.</li> </ul>

Issue	Mitigation measure
	<ul style="list-style-type: none"> <li>• 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.</li> <li>• All site workers would be educated as to the potential for noise impacts of 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: <ul style="list-style-type: none"> <li>– avoid the use of outdoor radios during the night period</li> <li>– avoid shouting and slamming doors</li> <li>– 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</li> <li>– avoiding dropping materials from height and metal to metal contact where practicable.</li> </ul> </li> <li>• Truck drivers would be informed of designated vehicle routes, parking locations and the requirement to minimise engine idling.</li> <li>• Non-tonal reversing beepers (or an equivalent mechanism) would be used by construction vehicles and plant regularly used on site (ie greater than one day).</li> <li>• 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.</li> <li>• If out of hours works are required, the contractor would prepare and submit a Transport for NSW <i>Out of Hours Work Assessment</i> (3TP-PR-065) and Application Form (9TP-FT-079) for approval prior to the works being undertaken. All out of hours works to be undertaken in accordance with the Construction Noise Strategy (Transport for NSW, 2012).</li> <li>• For activities outside the recommended standard hours, noise monitoring and letter box drops would be undertaken at residences and other non-residential receivers where noise levels are clearly audible.</li> <li>• 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.</li> <li>• Sensitive receivers within the safe working distance buffers would be informed of the nature of the works, duration and provided with contact details.</li> <li>• A dilapidation survey would be prepared for all heritage buildings and structures located within 13 m of construction involving vibration</li> </ul>

Issue	Mitigation measure
	<p>intensive compaction equipment.</p> <ul style="list-style-type: none"> <li>• Compliance vibration monitoring would be undertaken during operation of any vibration intensive construction equipment to ensure compliance with the building damage criteria for heritage buildings or structures.</li> <li>• A trigger alarm system would be implemented to notify site personnel in the event that vibration limits are close to being exceeded.</li> <li>• Provide alternative equipment or methodologies where feasible and reasonable to minimise vibration impacts.</li> </ul> <p><i>Operation</i></p> <ul style="list-style-type: none"> <li>• Any noise complaints would be investigated in accordance with Sydney Train's standard operational procedures.</li> </ul>
Flora and fauna	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• 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.</li> </ul>
Traffic and transport	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• A traffic management sub-plan would be prepared as part of the CEMP. It would include the following measures.</li> <li>• Traffic and access would be managed in accordance with Traffic Control at Work Sites (RTA, 2010) and in consultation with Roads and Maritime Services and City of Sydney Council.</li> <li>• Residents, property owners and operators would be notified of any access restrictions in advance of work commencing. Site access and work scheduling arrangements would be finalised in consultation with the owners and operators of adjoining sites, including the bus layover area, to minimise the potential impacts on the operation of, and access to, these sites.</li> <li>• Appropriate traffic management 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.</li> <li>• Safe access points to work areas from the adjacent road network 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.</li> <li>• 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).</li> <li>• Heavy vehicles would be restricted to specified routes.</li> </ul>

Issue	Mitigation measure
	<ul style="list-style-type: none"> <li>• Oversized deliveries would be undertaken in accordance with the requirements of Roads and Maritime Services and NSW Police.</li> <li>• Workers would be encouraged to access the proposal site via public transport.</li> </ul>
Air quality	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• An air quality management sub-plan would be prepared as part of the CEMP. It would include the following measures. <ul style="list-style-type: none"> <li>– All plant and machinery would be fitted with emission control devices complying with the Australian Design Standards.</li> <li>– Machinery would be turned off when not in use and not left to idle for prolonged periods.</li> <li>– 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 RMS and Council) and parking areas.</li> <li>– 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.</li> <li>– Any waste produced on site would be stored and stockpiled for removal off site daily, to reduce the production of dust.</li> <li>– Materials transported to and from the site would be covered to reduce dust generation in transit.</li> <li>– 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.</li> <li>– Stabilisation of any excavated areas as soon as practicable.</li> <li>– Fixed hoses would be used to dampen exposed surfaces to minimise dust generation, where required.</li> <li>– Shade cloth would be fastened to the perimeter fence on the construction compound to minimise dust transported from the site during construction.</li> </ul> </li> </ul> <p><i>Operation</i></p> <ul style="list-style-type: none"> <li>• Maintenance of switchgear and management of SF6 would be undertaken in accordance with Sydney Trains existing management procedures.</li> </ul>

Issue	Mitigation measure
Land use, social and visual environment	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• Material would be attached to the site fencing to minimise views of the worksite.</li> <li>• The worksite would be left in a tidy manner at the end of each work day.</li> <li>• Directional lighting would be mounted to avoid light spill into adjoining residential buildings during any night works, particularly during the rail shutdown periods.</li> </ul> <p><i>Operation</i></p> <ul style="list-style-type: none"> <li>• The detailed design of the proposal would take into account relevant urban design and visual considerations.</li> </ul>
Electromagnetic energy	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• During commissioning of the substation, 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.</li> <li>• In the event exclusion zones around equipment cannot be provided, magnetic shielding would be considered.</li> </ul>
Aboriginal heritage	<p><i>Construction</i></p> <ul style="list-style-type: none"> <li>• Should Aboriginal heritage items be uncovered all work in the vicinity will cease and the Project Manager and Transport for NSW staff will be notified immediately. OEH will be notified in accordance with the National Parks and Wildlife Act 1979. The local Aboriginal Land Council will be notified and an assessment by an archaeologist will be arranged to determine the significance of the objects and any other requirements before work resumes.</li> </ul>
Waste	<ul style="list-style-type: none"> <li>• Wastes generated by the proposal would be managed in accordance with the Waste Classification Guidelines (DECCW, 2009) and in accordance with the waste minimisation hierarchy as follows: <ul style="list-style-type: none"> <li>– avoidance, where possible</li> <li>– treated, as required and reused on-site</li> <li>– recycled, either within the process or off-site</li> <li>– where other alternatives are not possible, wastes would be disposed of at appropriately licensed waste management facilities.</li> </ul> </li> </ul>
Cumulative impacts	<ul style="list-style-type: none"> <li>• Transport for NSW and/or the construction contractor would consult with the proponents of any major developments in the vicinity of the proposal site to address any potential cumulative impacts.</li> </ul>

## 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 Lee Street, Chippendale. 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 the existing power supply in the vicinity of Central Station would reach capacity by 2016, and that the existing Prince Alfred Substation could not be easily upgraded to meet these requirements.

The construction of the Lee Street Substation (together with Chalmers Street Substation) would increase the capacity of the power supply network in the vicinity of Central Station.

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 to 13 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.

#### 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. These included specialist assessments of heritage, noise and vibration and electromagnetic energy.

There are considered to be no significant environmental issues associated with the proposal. The main potential impacts that would require management are:

- construction traffic and access to properties neighbouring the proposal and also the movement of heavy vehicles to the site, in particular oversized vehicles for equipment delivery
- construction noise and vibration impacts to nearby sensitive receivers
- heritage impacts as a result of the proposal being located within the Central Station site/group heritage precinct.

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.

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