

More Trains, More Services

Mascot Substation Project

Review of Environmental Factors



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Abbreviations

Term	Meaning
μT	Microtesla
AC	Alternating current
ACM	Asbestos containing material
AHIMS	Aboriginal Heritage Information Management System
AIMDs	Active Implanted Medical Devices
ARI	Average Recurrence Interval
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASA	Asset Standards Authority (refer to Definitions)
ASS	Acid Sulfate Soils
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
CBD	Central Business District
CCTV	Closed Circuit Television
CEMP	Construction Environmental Management Plan
CLM Act	<i>Contaminated Land Management Act 1997 (NSW)</i>
CNVMP	Construction Noise and Vibration Management Plan
CNVS	<i>Construction Noise and Vibration Strategy (TfNSW, 2019h)</i>
DBH	Diameter at Breast Height
DBYD	Dial Before You Dig
DC	Direct current
DEE	Commonwealth Department of the Environment and Energy
DPC	Department of Premier and Cabinet
DPIE	Department of Planning, Industry and Environment
ECM	Environmental Controls Map
EIS	Environmental Impact Statement
EMF	Electric and magnetic fields
EMS	Environmental Management System

Term	Meaning
EPA	Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EP&A Regulation	<i>Environmental Planning and Assessment Regulation 2000 (NSW)</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development (refer to Definitions)
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
GLVIA3	Guidelines for Landscape and Visual Impact Assessment (Third Edition)
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
Hz	Hertz
ICNG	<i>Interim Construction Noise Guideline (Department of Environment and Climate Change, 2000)</i>
ICNIRP	International Commission on Non-Ionizing Radiation Protection
Infrastructure SEPP	<i>State Environmental Planning Policy (Infrastructure) 2007 (NSW)</i>
ISCA v1.2	Infrastructure Sustainability Council of Australia Version 1.2
kV	kilo Volt
LEP	Local Environmental Plan
LGA	Local Government Area
LV	Low Voltage
LVIA	Landscape and Visual Impact Assessment
mG	Milligauss
MNES	Matters of National Environmental Significance
MTMS	More Trains More Services
MV	Medium Voltage
NCA	Noise Catchment Area
NML	Noise Management Level
NPfi	Noise Policy for Industry (NSW Environment Protection Authority, 2017)
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>

Term	Meaning
NSW	New South Wales
OEH	NSW Office of the Environment and Heritage
OOHW	Out of Hours Works
POEO Act	<i>Protection of the Environment Operations Act 1997 (NSW)</i>
RAP	Remediation Action Plan
RailCorp	(former) Rail Corporation of NSW
RBL	Rating Background Level
REF	Review of Environmental Factors (this document)
Roads Act	<i>Roads Act 1993 (NSW)</i>
ROL	Road Occupancy Licence
SEPP	State Environmental Planning Policy
SHR	State Heritage Register
SI	System of Units
TCP	Traffic Control Plan
T	Tesla
TfNSW	Transport for NSW
TMP	Traffic Management Plan
TPZ	Tree Protection Zone
VDV	Vibration Dose Values
V	Volt
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001 (NSW)</i>

Definitions

Term	Meaning
Average Recurrence Interval	The likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood would occur on average once every 100-years.
Asset Standards Authority	The ASA is an independent body within TfNSW, responsible for engineering governance, assurance of design safety, and ensuring the integrity of transport and infrastructure assets. Design Authority functions formerly performed by RailCorp are now exercised by ASA.
Concept design	The concept design is the preliminary design presented in this REF, which would be refined by the Construction Contractor (should the Proposal proceed) to a design suitable for construction (subject to TfNSW acceptance).
Construction Contractor	The organisation(s) engaged by TfNSW to undertake the design and construction of the Proposal.
Design and Construct Contract	A method to deliver a project in which the design and construction services are contracted by a single entity known as the Construction Contractor. The Construction Contractor completes the project by refining the concept design presented in the REF and completing the detailed design so that it is suitable for construction (subject to TfNSW acceptance). The Construction Contractor is therefore responsible for all work on the project, both design and construction.
Detailed design	Detailed design broadly refers to the process that the Construction Contractor undertakes (should the Proposal proceed) to refine the concept design to a design suitable for construction (subject to TfNSW acceptance).
Ecologically Sustainable Development	As defined by clause 7(4) Schedule 2 of the EP&A Regulation. Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased.
Feasible	A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements.
Noise sensitive receiver	In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios and places of worship/religious facilities (e.g. churches).
Out of hours works	Defined as works <i>outside</i> standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).
Proponent	A person or body proposing to carry out an activity under Division 5.1 of the EP&A Act - in this instance, TfNSW.

Term	Meaning
(the) Proposal	The construction of the substation and the installation of the underground transmission cable circuit 166 O’Riordan Street and associated ancillary works.
Reasonable	Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure.
Sensitive receivers	Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.
South Coast Line	The intercity element of the Sydney Trains and NSW TrainLink service connecting Sydney to the Illawarra Region.
Stabling	Areas of a rail network where trains are temporarily stored and cleaned and maintained (unscheduled minor maintenance activities only).
Sydney Trains	From 1 July 2013, Sydney Trains replaced CityRail as the provider of metropolitan train services for Sydney.
T4 Eastern Suburbs and Illawarra Line	An existing commuter rail line on the Sydney Trains Network connecting Bondi Junction to Cronulla and Waterfall.
T8 Airport and South Line	An existing commuter rail line on the Sydney Trains Network connecting the Sydney CBD with the southwestern suburbs.
Transport for NSW (formerly Roads and Maritime Services)	Roads and Maritime Services was amalgamated into Transport for NSW on 1 July 2019.
Vegetation Offset Guide	<p>The TfNSW guide that applies where there is vegetation clearing proposed, and where the impact of the proposed clearing is not deemed ‘significant’ for the purposes of section 5.7 of the EP&A Act.</p> <p>The Guide provides for planting of a minimum of eight trees for each large tree with a diameter at breast height (DBH) of more than 60 cm, four trees where the DBH is 15-60 cm, or two trees where DBH is less than 15 cm.</p>

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Executive summary

Overview

Transport for NSW (TfNSW) proposes to deliver service improvements on the T4 Illawarra Line, South Coast Line and T8 Airport Line. These improvements are part of the More Trains, More Services program (the Program) that over the next ten years will transform the rail network and provide customers with more reliable, high capacity turn up and go services.

As part of the Program, TfNSW proposes to construct a new substation at Mascot (the Proposal).

TfNSW is the government agency responsible for the delivery of major transport infrastructure projects in NSW and is the proponent for the Proposal.

The main features of the Proposal are:

- a new substation at 166 O’Riordan Street, Mascot
- ancillary works, including new security fencing around the substation, lighting and CCTV
- upgrading of security fencing around the mobile antenna located behind the new substation
- operation of the Proposal.

This Review of Environmental Factors (REF) has been prepared to assess the environmental impacts associated with the construction and operation of the Proposal under the provisions of Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Subject to approval, construction is expected to commence in 2020 and take around two and a half years to complete. A detailed description of the Proposal is provided in **Chapter 3** of this REF.

Need for the Proposal

Sydney’s population is growing, and the rail network is one of the busiest in the southern hemisphere, with a record 400 million passengers each year. Over the past five years there has been unprecedented demand, with rail patronage increasing by 30 percent. Even after the full commencement of Sydney Metro in 2026, the heavy rail network will continue to carry 80 percent of all rail passengers, and around 60 percent of all peak hour transport travel.

In parallel with the new metro train system, the Program will simplify the rail network and create high capacity, turn up and go services for customers in the future. While More Trains, More Services will eventually deliver benefits to the entire network, TfNSW propose to start by targeting improvements on Sydney’s busiest lines.

The first lines to benefit from the Program will be the T4 Eastern Suburbs and Illawarra Line, the South Coast Line and the T8 Airport and South Line. These are some of the busiest lines on the Sydney Trains network, catering for 410,000 return trips in a typical day, representing around one third of all daily Sydney Trains daily customers.

The Proposal would address the growing demands on the network by providing customers with more services that are more reliable, increasing the overall network capacity along the T8 Airport Line. This will be undertaken by upgrading and modernising power and control systems and through the use of digital technology.

Chapter 2 of this REF further describes the need for the Proposal and outlines the options considered in developing the design.

Community and stakeholder consultation

Community consultation activities for the Proposal would be undertaken during the public display period of this REF and the public invited to submit feedback to help TfNSW understand what is important to customers and the community. The REF would be displayed for a period of two weeks. Further information about these specific consultation activities is included in Section 5 of this REF.

During the display period a Project Infoline (1800 684 490) and email address (projects@transport.nsw.gov.au) would also be available for members of the public to make enquiries.

In accordance with the requirements of *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP), consultation is required with local councils and/or public authorities under certain circumstances. This includes where infrastructure managed by a council or other public authority is affected by the Proposal. Initial consultation has been undertaken during the development of design options with Bayside Council and Transport for New South Wales (TfNSW) (formerly Roads and Maritime Services). Consultation with these stakeholders throughout the detailed design and construction of the Proposal.

View the plans:

The REF can be viewed at:

- transport.nsw.gov.au/projects/mtms
- nsw.gov.au/improving-nsw/haveyoursay
- Transport for NSW, 241 O’Riordan Street, The Gateway, Mascot
- Mascot Library, 2 Hatfield Street, Mascot

Feedback can be sent to:

- projects@transport.nsw.gov.au
- More Trains, More Services Program – Mascot Substation

Associate Director, Environmental Impact Assessment
Transport for NSW
Locked Bag 6501
St Leonards NSW 2065

TfNSW would review and assess all feedback received during the public display period, prior to determining whether or not to proceed with the Proposal.

Should the Proposal proceed to construction, the community would be kept informed throughout the duration of the construction period. **Figure E1** shows the planning approval and consultation process for the Proposal.

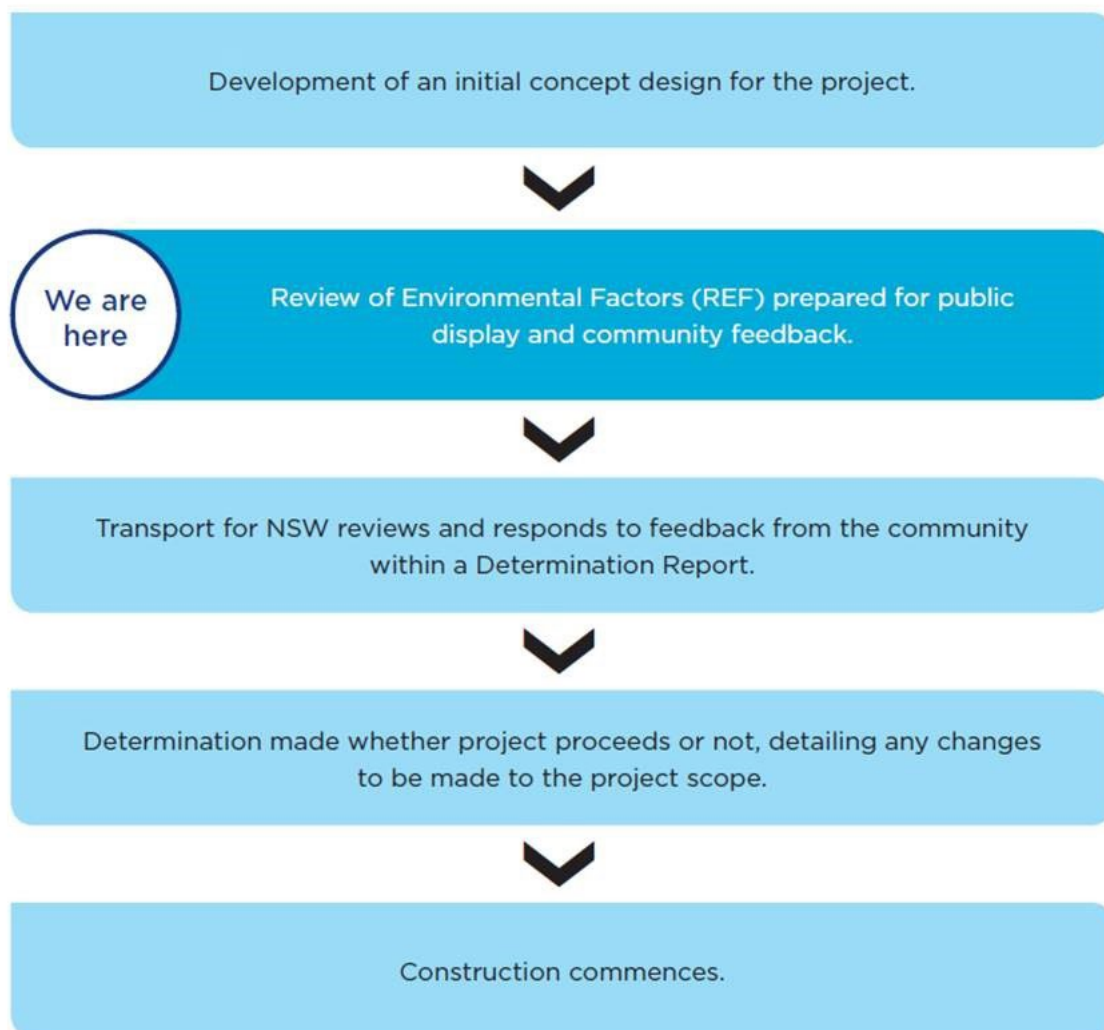


Figure E.1 Planning approval and consultation process for the Proposal

Environmental impact assessment

This REF identifies the potential environmental benefits and impacts of the Proposal and proposes mitigation measures to reduce the identified adverse impacts.

The Proposal would provide

additional capacity for the operation of suburban trains on the T8 Airport Line to support an uplift in the number of services.

The following key potential impacts have been identified:

- temporary changes to vehicle and pedestrian movements in and around the substation during construction of the Proposal
- visual amenity impacts during construction and operation
- noise and vibration impacts during construction and operation
- electric and magnetic fields during operation.

Further information regarding these potential impacts is provided in **Chapter 6** of the REF.

Conclusion

This REF has been prepared having regard to sections 5.5 and 5.7 of the EP&A Act, and clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). These require that TfNSW takes into account, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The impact assessment undertaken within this REF indicates that the Proposal would not result in a significant impact upon the environment, including areas of outstanding biodiversity value, threatened species, populations, ecological communities or their habitats.

Impacts associated with the key issues outlined above would be temporary during construction or of a low magnitude during operation. As such none of these impacts would be significant.

Should the Proposal proceed, any potential adverse impacts would be appropriately managed in accordance with the mitigation measures outlined in this REF, and the conditions of approval imposed in the Determination Report. This would minimise the environmental and amenity impacts associated with the Proposal, whilst maximising the overall benefit to the community.

1 Introduction

Transport for NSW (TfNSW) was established in 2011 as the lead agency for integrated delivery of public transport services across all modes of transport in NSW. TfNSW is the proponent for the construction of the substation and the installation of the underground transmission cable circuit between 166 O’Riordan Street and Mascot Station (the Proposal).

1.1 Overview of the Proposal

1.1.1 The More Trains, More Services Program

Over the next ten years the More Trains, More Services Program (the Program) will simplify and modernise the rail network, creating high capacity and turn up and go services for many customers. Customers will experience more frequent train services, with less wait times, less crowding and more seats on a simpler, more reliable network.

While the Program will eventually deliver benefits to the entire network, it will start by targeting improvements on Sydney’s busiest lines. The first lines to benefit from the program will be the T4 Eastern Suburbs and Illawarra Line, the South Coast Line and the T8 Airport and South Line.

The Program is about building a modern and up to date rail system that will play its part in making Sydney a more productive and liveable city. The NSW Government’s *Future Transport Strategy 2056* (TfNSW, 2018a) identifies the Program as a priority initiative and is a commitment to the state’s transport and infrastructure needs.

The Program is key to enabling Greater Sydney Commission’s vision for the Greater Sydney Region Plan, *A Metropolis of Three Cities*, where most residents live within 30 minutes of their jobs, education and health facilities, services and great places.

More Trains, More Services is a program of staged investments that will progressively transform the rail network into a modern and reliable system using world class technology.

The program is already delivering better customer outcomes through timetable enhancements and the integration of the Sydney Metro Northwest with the existing heavy rail network. The current stage of the Program will focus on delivering greater capacity, reliability and connectivity for customers on the T4 Eastern Suburbs and Illawarra Line, South Coast Line and T8 Airport and South Line.

These services will be enabled by upgrading and modernising signalling and control systems and using digital technology that, when combined with other infrastructure upgrades, will deliver major increases in the capacity and reliability of the network.

1.1.2 The need for the Proposal

Sydney’s population is growing, and the rail network is one of the busiest in the southern hemisphere, with a record 400 million trips each year. There has been unprecedented customer demand, with rail patronage increasing by 30 per cent over the last five years. Even after the full commencement of Sydney Metro in 2026, the heavy rail network will continue to carry 80 percent of all rail passengers, and around 60 percent of all peak hour transport travel.

Along with building a new metro train system, the More Trains, More Services program will simplify the rail network and create high capacity, turn up and go services for customers.

While More Trains, More Services will eventually deliver benefits to the entire network, TfNSW propose to start by targeting improvements on Sydney’s busiest lines. The first lines to benefit from the Program will be the T4 Eastern Suburbs and Illawarra Line, the South Coast Line and the T8 Airport and South Line. These are some of the busiest lines on the Sydney Trains network,

catering for 410,000 return trips in a typical day, representing around one third of all daily Sydney Trains customers.

Future stages of More Trains, More Services will deliver a 30 percent increase in peak services on the T4 Illawarra Line, and an 80 percent increase at stations between Green Square and Wolli Creek, meaning trains at least on average every four minutes instead of every six minutes.

As part of the Program, TfNSW propose to upgrade the power supply of the T8 Airport Line including the construction of a new substation at Mascot, which would enable an increase to the number of trains per hour that can be accommodated along this line.

During the development of the T8 Transformation Definition Design stage, it became evident that a new traction substation is required at Mascot. A site at 166 O’Riordan Street was identified by TfNSW as the location for the Mascot Substation.

The new substation at 166 O’Riordan Street, Mascot would provide supplementary capacity of the existing functions of the traction substations feeding the T8 Line traction and station power, as well as providing operational flexibility and availability of the feeding arrangements.

These needs would be directly addressed by the Proposal (see **Section 3** for more detail).

1.1.3 Key features of the Proposal

The key features of the Proposal are summarised as follows:

- a new traction substation at 166 O’Riordan Street, Mascot
- ancillary works at the substation site, including new security fencing, lighting and CCTV
- upgrading of security fencing around the mobile antenna located behind the new substation
- operation of the Proposal.

Subject to planning approval, construction is expected to commence in 2020 and take approximately two and a half years to complete.

A detailed description of the Proposal is provided in **Chapter 3** of this Review of Environmental Factors (REF).

1.2 Location of the Proposal





The Proposal is located at 166 O’Riordan, Mascot NSW. The proposed traction substation is approximately seven kilometres south of the Sydney CBD. The Proposal would be undertaken wholly within the suburb of Mascot in the Bayside Local Government Area (LGA).

The location of the Proposal and the regional context is shown in **Figure 1.1**.



FIGURE 1-1: REGIONAL CONTEXT



- Legend**
-  Railway station
 -  Railway
 -  Motorway
 -  Park/Reserve

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1.3 Existing infrastructure and land uses

The propose site for the traction substation at 166 O’Riordan Street is owned by TfNSW. The site is currently vacant.

The nearest major transport hub is Mascot Station, approximately 500 metres to the north. This station is part of the T8 Airport and South Line. The station consists of two platforms, located underground with the entrance from Bourke Street.

Under the *Botany Bay Local Environmental Plan 2013* (Botany Bay LEP 2013) the location proposed for Mascot Substation is zoned ‘B5 Business Development’.

Mascot Public School is located approximately 200 metres to the east of the proposed substation. There are four areas zoned ‘RE1 Public Recreation’ in proximity to the Proposal site including Mascot Oval, John Curtin Memorial Reserve, Coleman Reserve and Nancy Bird-Walton Reserve.

Figure 1.2 shows the location of the Proposal and the corresponding land use zoning.

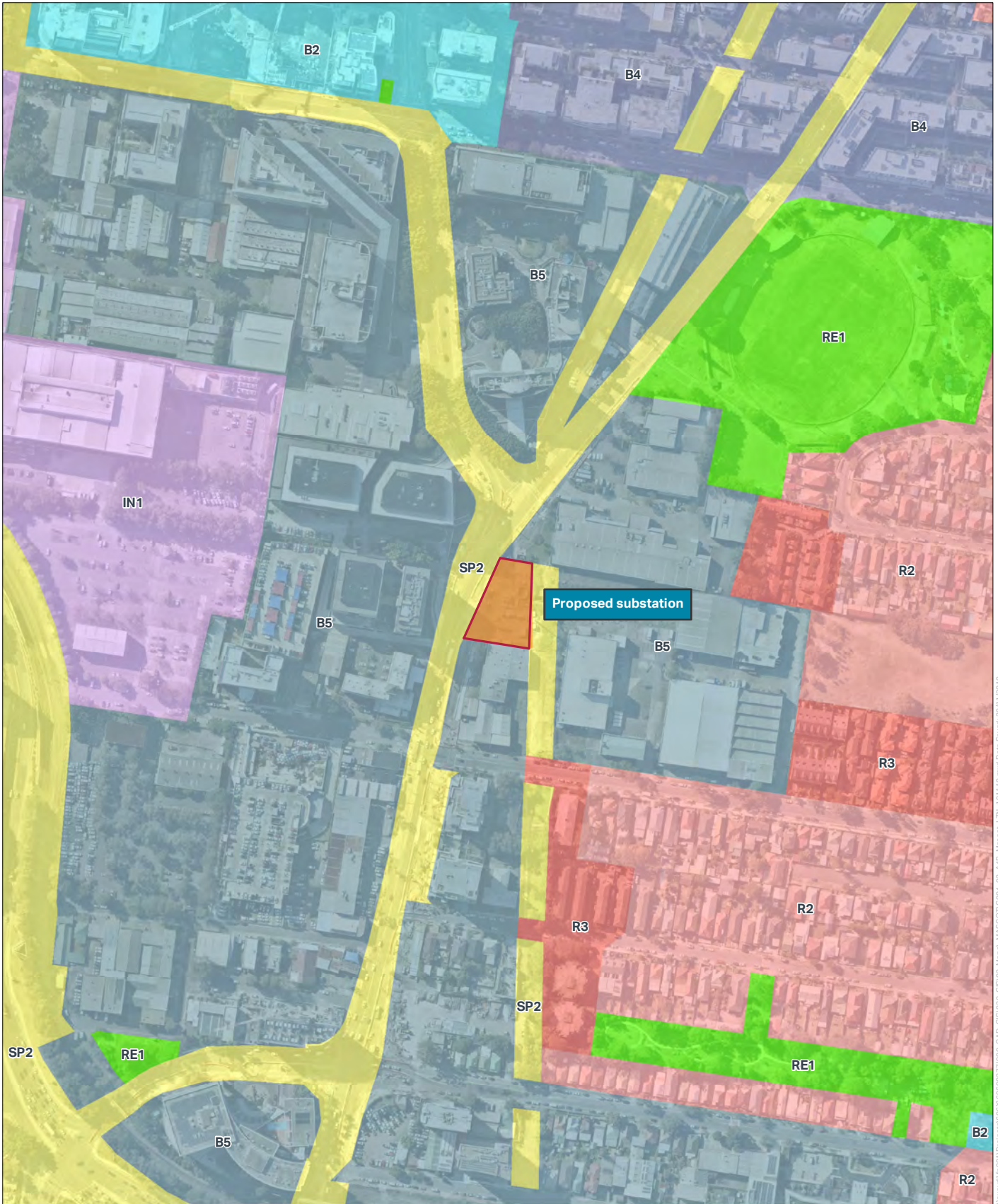












FIGURE 1-2: LAND USE ZONING SURROUNDING THE PROPOSAL AREA (BOTANY BAY LEP, 2013)

Legend

- | | |
|--|---|
|  Construction compound/laydown areas |  B7 Business Park |
| Land Zoning |  IN1 General Industrial |
|  B2 Local Centre |  R2 Low Density Residential |
|  B4 Mixed Use |  R3 Medium Density Residential |
|  B5 Business Development |  RE1 Public Recreation |
| |  SP2 Infrastructure |



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1.4 Purpose of this Review of Environmental Factors

The purpose of this REF is to describe the Proposal, to assess the likely impacts of the Proposal having regard to the provisions of section 5.5 of the EP&A Act, and to identify measures to avoid, reduce, mitigate or offset the likely adverse impacts. This REF has been prepared in accordance with clause 228 the EP&A Regulation. For the purposes of this Proposal, TfNSW is the proponent and the determining authority under Division 5.1 of the EP&A Act.

This assessment has also considered the relevant provisions of other relevant environmental legislation, including the *Biodiversity Conservation Act 2016* (BC Act), *Fisheries Management Act 1994* (FM Act) and the *Roads Act 1993* (Roads Act).

Having regard to the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), this REF considers the potential for the Proposal to have a significant impact on Matters of National Environmental Significance (MNES) or Commonwealth land. It also considers the need to make a referral to the Commonwealth Minister for the Environment should the action have the potential to result in a significant impact on MNES. Refer to **Chapter 4** for more information on statutory considerations.

2 Need for the Proposal

Chapter 2 discusses the need and objectives of the Proposal, having regard to the objectives of the Program. This chapter also provides a summary of the options that have been considered during development of the Proposal and why the preferred option has been chosen.

2.1 Strategic justification

2.1.1 Overview

The NSW Government's *Future Transport Strategy 2056* (TfNSW, 2018) identifies the More Trains, More Services Program as a 'priority initiative for investigation' that will provide modern and reliable 'turn up and go' services for customers.

Over the next 40 years, the rail network in Sydney will need to handle 28 million trips a day and double the current metropolitan freight capacity. By 2026, it is expected that the heavy rail network will carry around 80 percent of peak hour rail travel and 60 percent of all peak hour transport travel.

More Trains, More Services is key to enabling Greater Sydney Commission's vision for the Greater Sydney Region Plan, A Metropolis of Three Cities (Greater Sydney Commission, 2018), where most residents live within 30 minutes of their jobs, education and health facilities, services and great places

More Trains, More Services is a program of staged investments that will progressively transform the rail network into a modern and reliable mass transit system using world class technology. The program is already delivering better customer outcomes through timetable enhancements and the integration of the Sydney Metro Northwest with the existing heavy rail network. The current stage of More Trains, More Services will focus on delivering greater capacity, reliability and connectivity for customers on the T4 Eastern Suburbs and Illawarra Line, South Coast Line and T8 Airport and South Line.

These services will be enabled by upgrading and modernising signalling and control systems and using digital technology that, when combined with other infrastructure upgrades, will deliver major increases in the capacity and reliability of the network.

2.1.2 Objectives of the More Trains, More Services Program

The objectives of the More Trains, More Services Program are to:

- maintain connectivity and support efficient functioning of urban and regional centres
- meet future mass transit demand on the T4 and T8 Lines
- improve travel experience for each customer passenger group
- reduce complexity on the heavy rail network
- meet freight customer needs.

2.1.3 Customer outcomes of More Trains, More Services Program

Customer outcomes of the More Trains, More Services Program are to:

- provide additional train and station capacity for T4 and T8 customers in line with forecast peak demand
- provide dedicated intercity services on the South Coast line that improve the customer in-vehicle experience and provides a service consistent with other intercity lines

- improve off-peak services on the T4 and South Coast lines to align with customer requirements
- provide regular freight opportunities on the Illawarra corridor which maintains (and where possible enhances) the network capacity for freight services
- reduce network complexity on the T4 and T8 lines through simplified service routes, stopping patterns and asset utilisation
- minimise the impact on other lines that may be affected by service changes on the T4, T8 and South Coast Lines.

2.1.4 Objectives of the Proposal

The specific objectives of the proposed improvements at Mascot are to:

- provide additional power to the T8 Line traction system and station power supplies, as well as providing improved operational flexibility and supply availability
- minimise impacts to current rail operations during implementation
- ensure that safety is maintained throughout the delivery of the Proposal
- ensure that project works are delivered to TfNSW high standards of safety, quality, stakeholder engagement and environmental management.

2.2 Design development

The concept design for the proposal has been developed with consideration of the following objectives:

- provide a new substation to provide additional power to the T8 line traction system and station power supplies
- provide interconnection to the existing rail high-voltage 33kV and 11kV power networks
- provide for connection of utility services and provision of facilities to support staff and equipment associated with the operations and maintenance of the substation
- architecture that blends into, and complements the context of the site.

2.3 Alternative options considered

2.3.1 The 'do-nothing' option

Under a 'do-nothing' option, the Airport Line tunnel and the existing rail infrastructure would remain the same, and there would be no changes to the way the T8 Airport Line currently operates.

The 'do-nothing' option was not considered a feasible alternative as it is inconsistent with NSW Government objectives. Further, it would not assist in facilitating the increased number of services that would operate on the T8 Line, as without the power upgrades, this line cannot accommodate the required amount of additional services.

2.3.2 Substation works – the preferred option

Under this option, the proposed traction substation would be constructed at 166 O'Riordan Street. The Proposal is designed to support the T8 Airport Line. The new substation would provide capacity to supplement the existing function of the traction substations feeding the T8 Line traction and station power, as well as providing operational flexibility.

During the development of the concept design, a number of options were considered and assessed for the proposed substation works, as described below.

2.3.3 Substation layout options

Option 1

Option 1 is intended to minimise construction over the Sydney Water culvert and associated easement that traverses the site. Feeder cables would still need to cross the culvert to exit the substation site. For this option, feeders would need to cross the Sydney Water culvert before entering the cable containment area within the substation, adding to the complexity of the feeder route and require construction within the clearances for Sydney Water assets. Refer to **Figure 2.1** for the Option 1 layout.

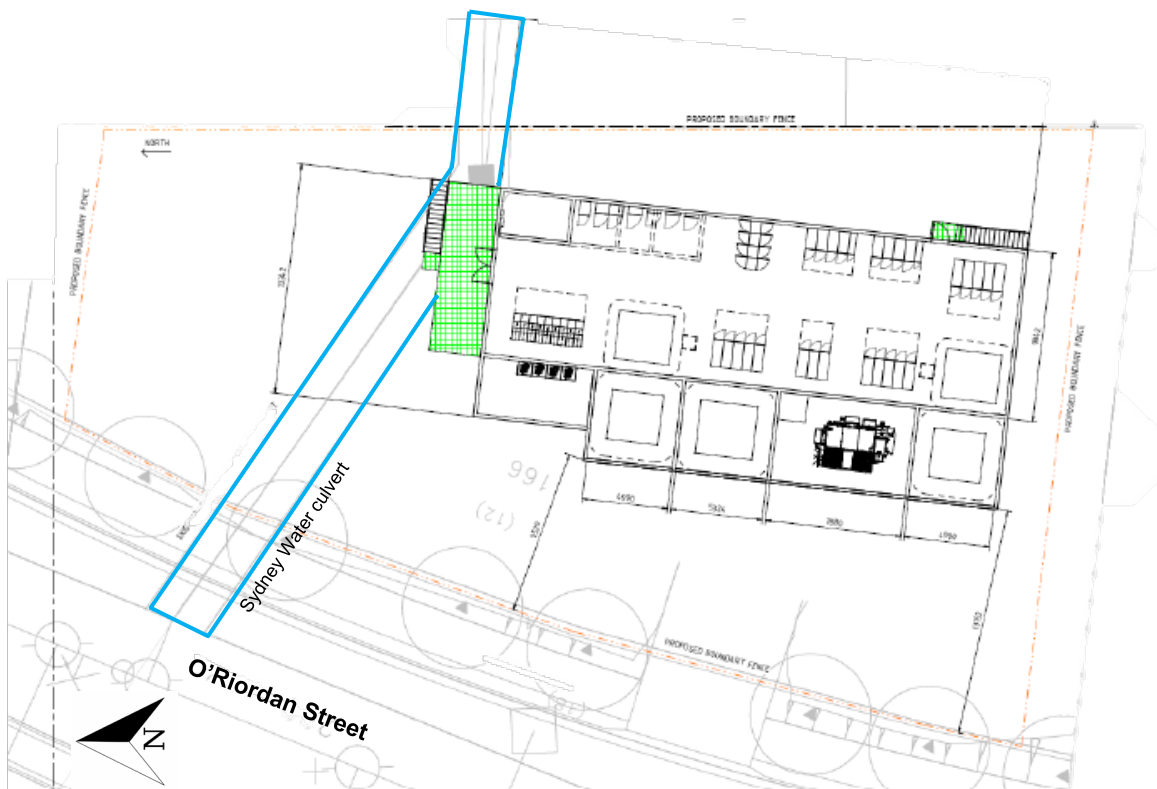


Figure 2.1 Mascot Substation - Option 1

Option 2

Option 2 is intended to maximise the set-back from the property boundary along O'Riordan Street. Feeder cables can be trenched from the north of the site without impacting on or crossing the culvert however construction would also be required over the Sydney Water culvert, within the necessary asset clearance area. Refer to **Figure 2.2** for the Option 2 layout.

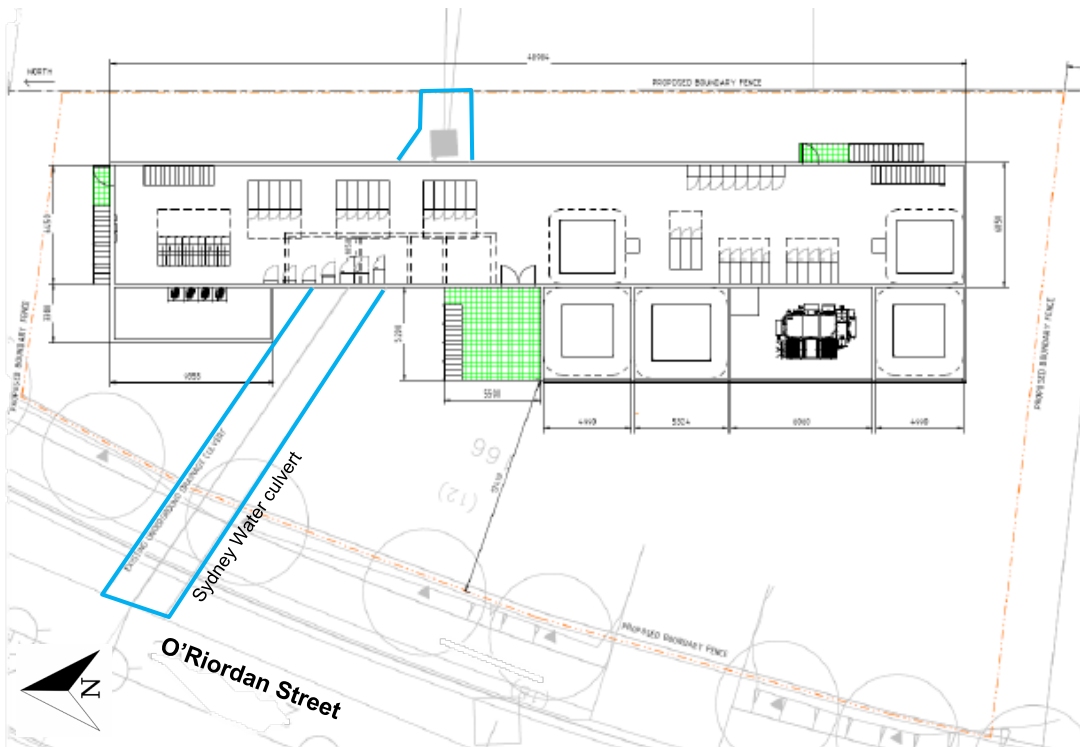


Figure 2.2 Mascot Substation - Option 2

Option 3

Option 3 is also intended to minimise the amount of structure located over the Sydney Water culvert, whilst maximising set-back from the property boundary along O’Riordan Street. Feeder cables can be trenched from the north of the site without impacting on the culvert. This option would also require construction within the minimum clearance area for the Sydney Water culvert. Refer to **Figure 2.3** for the Option 3 layout.

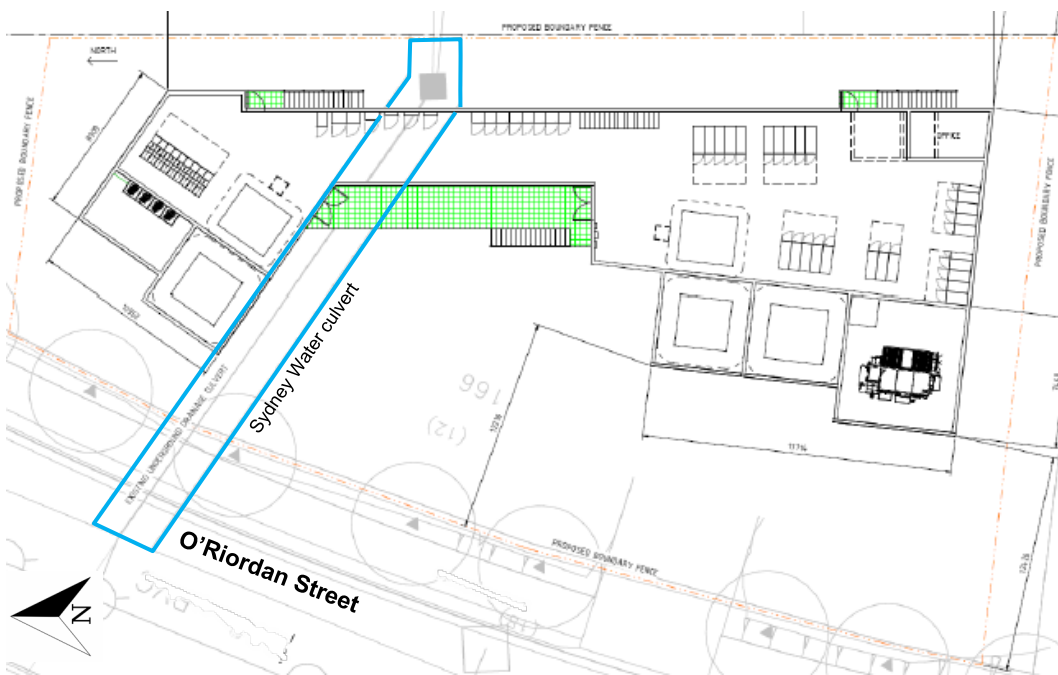


Figure 2.3 Mascot Substation - Option 3

Option 4

Option 4 is the preferred option as it has accounted for all of the key criteria for the substation including spatial footprint, construction complexity, maintainability and accessibility, feeder route, logistics (craneage and access) and constraints of the Sydney Water culvert. Refer to **Figure 2.4** for the preferred substation layout.

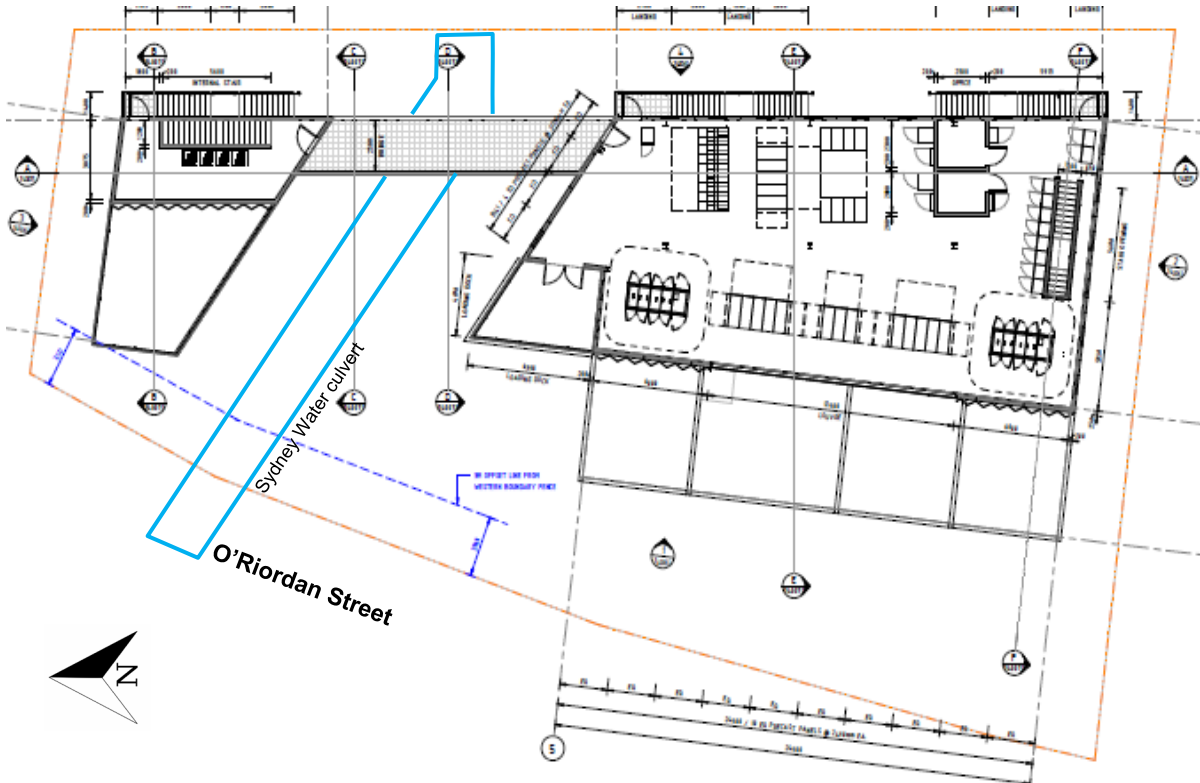


Figure 2.4 Mascot Substation - Option 4

2.4 Justification for the preferred option

The 'do-nothing' option was rejected as this option would not address the need to increase the number of services along the T8 Airport Line. This would also fail to meet the objectives of both the MTMS program and the Proposal, as outlined in **Section 2.1.4**.

Option 4 was selected as the preferred substation layout. This option would meet the required objectives, whilst also reducing the construction complexity, maintainability and accessibility, logistics (craneage and access) and constraints of the Sydney Water culvert.

3 Description of the Proposal

Chapter 3 describes the Proposal and summarises key design parameters, construction method, and associated infrastructure and activities. The description of the Proposal is based on the concept design and is subject to detailed design.

3.1 The Proposal

As described in **Section 1**, the Proposal involves the construction of a new substation at 166 O’Riordan Street, Mascot. This would enable an increase in the current number of trains travelling through the T8 Airport Line tunnel to 16 per hour per direction.

The Proposal would include the following key element:

- a new traction substation at 166 O’Riordan Street, Mascot.

The two-level substation would accommodate the following equipment and facilities:

- loading dock on first floor
- a switchroom including HV and 1500 V DC switchgear
- rectifiers
- transformers
- reactors
- office space and staff amenities (including kitchenette and emergency showers)
- batteries
- telecommunications and control systems equipment
- parking for two light vehicles.

Figure 3.1 illustrates the Proposal Area and key features of the Proposal.



FIGURE 3-1: PROPOSED WORKS AT MASCOT (INDICATIVE ONLY, SUBJECT TO DETAILED DESIGN)



Legend

- Proposed works
- Construction compound/laydown areas
- ▲ Site access point

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3.1.1 Scope of works

Mascot Substation

The property area of 166 O’Riordan Street is approximately 2,400 m².

The scope of works associated with the construction of the new two-level substation would accommodate the following equipment and facilities:

- loading dock on first floor
- a switchroom including HV and 1500V DC switchgear
- rectifiers
- transformers
- reactors
- office space and staff amenities (including kitchenette and emergency showers)
- batteries
- telecommunications and control systems equipment, and
- parking for two light vehicles.

The proposed substation building would be two asymmetrical shaped buildings connected by a pedestrian and cable bridge. The bridge component was designed to minimise the amount of infrastructure located over the Sydney Water culvert which crosses through the site from east to west.

The smaller size building located on the northern side is approximately 4.5-11 metres in width by approximately 11-14 metres in length. The main building to the south is between approximately 13 and 21 metres in width by approximately 25 to 31 metres in length. The bridge structure is approximately 15 metres long and 2.5 metres wide. Refer to **Figure 3.2** for the substation layout.

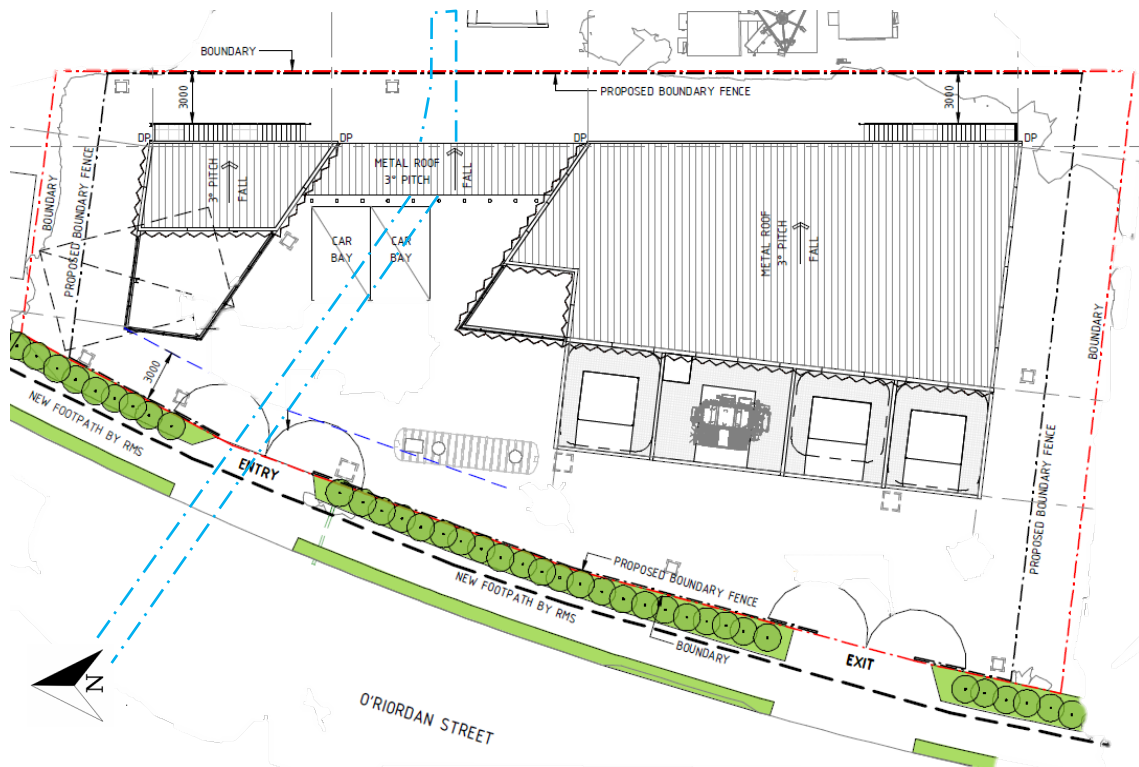


Figure 3.2 Mascot Substation layout

The building would be comprised of a two-level structure with a ground floor and first floor. The northern building would have electrical equipment on the first floor with access stairs from the ground floor. The southern building would have cable containment within the ground floor and the first floor would be for electrical equipment with loading dock and associated office space and staff amenities. The building would have a height of approximately 10 metres above the finished ground level. The building would be set back approximately 3 metres from the adjacent properties on the north, east and south and from O’Riordan Street.

Other works at the proposed substation site include:

- establishment of temporary site compounds for storage of materials and equipment
- removal of vegetation on the eastern boundary and south-west corner of the site
- earthworks, excavation for cable pit and ground improvement
- subgrade preparation for pavement
- installation of pipes and pits for drainage and/or conduits for cables
- construction of the new driveway with a suitable turning radius and associated works such as kerbs and gutters
- associated works around the substation including closed circuit television (CCTV), line-marking for two light vehicles parking, boundary fencing, construction of a new exit driveway and lighting
- upgrading of security fencing around the mobile antenna located behind the new substation.

Materials and finishes

Materials and finishes for the Proposal have been selected primarily based on their suitability for meeting design requirements. Other important factors considered were availability,

constructability, durability, low maintenance and cost effectiveness. This selection has sought to minimise visual impacts, and to be aesthetically pleasing.

Each part of the Proposal would be constructed from a range of different materials, with a different palette for each of the architectural elements. Subject to detailed design, the Proposal would include reinforced concrete floors, concrete footing and steel construction. Enclosed walls would be a combination of precast concrete panels and lightweight framing with prefinished wall cladding as depicted in the concept sketch. Access roads would be of concrete and asphalt.

This exterior walls and roof colour would be of a matte finish. Roofing elements would be of a pre-painted metal deck roof sheeting on insulation and sarking including roof rack system. All light weight framing walls and ceilings would be finished in sheeting. Perimeter openings for natural ventilation would be provided.

The transformer bays would be constructed of reinforced concrete bund and precast concrete fire walls. The rectifier transformer bays would allow the transformers and reactor to be craned in and out with a suitably sized mobile crane. Additionally, gates have been provided onto the access road for each transformer bay to enable the replacement of transformers if required.

The design would be submitted to TfNSW's Urban Design and Sustainability Review Panel at various stages for comment before being accepted by TfNSW. An Urban Design and Landscaping Plan (UDLP) would also be prepared by the Construction Contractor, prior to finalisation of detailed design for endorsement by TfNSW.

3.1.2 Engineering constraints

There are a number of constraints which have influenced the design development of the Proposal.

- **Existing structures:** the placement and integrity of existing structures needed to be considered during the development of the design – these structures included the Sydney Water culvert that has additional structural requirements and neighbouring properties
- **Utilities:** A Dial Before You Dig (DBYD) search has identified several utilities in the vicinity of the proposed works.

3.1.3 Design standards

The Proposal would be designed having regard to the following:

- Building Code of Australia
- relevant Australian and International Standards
- Asset Standards Authority standards
- Sydney Trains standards
- Infrastructure Sustainability Council of Australia (ISCA) Version 1.2
- Crime Prevention Through Environmental Design principles
- other TfNSW policies and guidelines.

3.1.4 Sustainability in design

The Proposal is targeting a rating of 'Excellent' using the Infrastructure Sustainability Council of Australia (ISCA) Infrastructure Sustainability (IS) Rating Scheme (v1.2). The rating scheme provides an independent and consistent methodology for the application and evaluation of

sustainability outcomes in infrastructure projects. The sustainability outcomes address environmental, social, economic and governance aspects.

The IS Rating Scheme is grouped into six key themes:

- management and governance
- using resources
- emissions, pollution and waste
- ecology
- people and place
- innovation.

These sustainability themes are divided into 15 performance categories, against which the Proposal would be independently assessed and assigned a rating level. The Proposal would need to achieve at between 50 and 75 points out of a possible 100 to be certified as 'Excellent'.

3.1.5 Construction methodology

Subject to approval, construction is expected to commence in 2020 and is anticipated to finish by the end of 2022. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Construction Contractor in consultation with TfNSW.

The sequence of activities required to construct the Proposal are identified in **Table 3.1**. This staging is indicative and is based on the current concept design and may change once the detailed design methodology is finalised. The staging is also dependent on the Construction Contractor's preferred methodology, program and sequencing of work. Should the Construction Contractor's methodology contain substantive departures from that outlined within the REF, further assessment would be undertaken to consider any new or altered environmental or amenity impacts.

Table 3.1 Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling works	<ul style="list-style-type: none"> • establishment of site compound and temporary facilities at 166 O'Riordan Street (i.e. erect fencing, site offices, temporary toilets, hoarding, amenities and plant/material storage areas) • installation of construction road signage as per Traffic Management Plan (TMP) • clearing of vegetation from works area, where possible • installation of environmental controls (i.e. erosion and sediment control fencing).
New Mascot Substation	<ul style="list-style-type: none"> • subgrade preparation for pavement • excavation and drainage works • construct new substation building • fit out substation building, including installation of electrical components (i.e. lighting, CCTV, PA system, etc.) • installation of boundary fencing and removable gate to O'Riordan Street • installation of conduits for cables • line-marking for light vehicle parking • construction of the new driveway with a suitable turning radius and associated works such as kerb and gutters.

Stage	Activities
Testing and commissioning	<ul style="list-style-type: none"> testing electrical, communications and signalling components.
Demobilisation	<ul style="list-style-type: none"> remove temporary site fencing dismantling of temporary site compounds/hoarding areas remove temporary construction signage.

3.1.6 Plant and equipment

The plant and equipment likely to be used during construction includes:

- bobcats
- trucks
- piling rigs
- sheet piling hammer
- cranes – various sizes
- excavators – various sizes
- dump trucks
- concrete pumps
- elevated working platforms
- winches.
- lighting towers
- generators
- light vehicles
- hand tools
- jackhammers
- demolition saws
- front end loaders
- agitators
- dewatering equipment

3.1.7 Working hours

The works required for the Proposal would be undertaken during standard (NSW) Environment Protection Authority (EPA) construction hours, which are as follows:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturdays
- no work on Sundays or public holidays.

Works would also need to occur outside standard hours and would include night works and works during rail possessions. These are scheduled closures where part of the rail network is temporarily closed, and trains are not operating.

Out of hours works may also be scheduled outside rail possession periods. The Construction Contractor would require approval from TfNSW for any out of hours work. The affected community would be notified in advance of any works, and mitigation measures would be implemented as outlined in TfNSW's *Construction Noise and Vibration Strategy* (TfNSW, 2019h) (refer to **Section 6.3** for further details).

3.1.8 Operating hours

The Mascot Substation operates 24 hours per day, seven days a week.

3.1.9 Earthworks

Excavations and earthworks would be required for the construction of the Mascot Substation.

Excavated material would be reused onsite where possible or disposed of in accordance with relevant legislative requirements.

It is estimated that the Proposal would generate approximately 620 cubic metres (m³) of spoil.

3.1.10 Source and quantity of materials

The source and quantity of materials would be determined during the detailed design phase of the Proposal and would consider the requirements of ISCA IS Rating Scheme version 1.2. Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

3.1.11 Traffic access and vehicle movements

Traffic generated by construction activities would include construction worker light vehicles (including utility vans), as well as heavy vehicles for periodic delivery and removal of materials, and construction plant and equipment.

The delivery of large materials and components would have short term impacts on traffic, pedestrians and parking particularly on O’Riordan Street which is a major arterial road (and is currently being upgraded). Appropriate planning and consultation should be undertaken to mitigate these impacts. Road occupancy licences may be needed if road closures are required.

Construction traffic for the new Mascot Substation would access the site via an existing driveway entrance from O’Riordan Street. The traffic generated as a part of these works is not expected to exceed 70 light vehicles and 30 heavy vehicles movements during the daytime and night-time construction periods.

During operation, the new driveway design would be approximately 6 metres in width. The driveway would be designed to allow suitable turning radius at the entrance from O’Riordan Street for low loaders, semi-trailers and mobile cranes. This is estimated to be appropriate for the general and heavy equipment (including transformers) at the substation. The vehicle and crane size have been estimated based on previous substation construction projects in NSW and would be reviewed during the detailed design phase. To allow suitable turning radius at the entrance from O’Riordan Street, the new gate and entire length of new fencing facing O’Riordan Street may need to be removable.

Traffic and transport impacts associated with the Proposal are assessed in **Section 6.1** of this REF.

A detailed construction methodology, management plans (such as Traffic Control Plans) and a Construction Environmental Management Plan (CEMP) would be developed prior to construction. These plans would be implemented and updated throughout construction to manage potential traffic and access impacts.

3.1.12 Ancillary facilities

The substation location at 166 O’Riordan Street is proposed to be used for site compounds/laydown areas to accommodate a site office, amenities and construction laydown and storage areas for equipment and materials.

The indicative proposed area for the site compounds/laydown areas is outlined **Figure 3.1**.

3.1.13 Public utility adjustments

The Proposal has been designed to avoid relocation of services where feasible, however further investigation may be required. It is likely some services may require relocation, including electricity, communications and utilities, but such relocation is unlikely to occur outside of the footprint of the works assessed in this REF. Should works be required outside of this footprint, further assessment would be undertaken. The appropriate utility providers would be consulted during the detailed design phase.

3.2 Property acquisition

TfNSW does not propose to acquire any property as part of the Proposal.

3.3 Operational management and maintenance

The substation site at 166 O’Riordan Street is currently owned by TfNSW. The site would likely still be owned by the same entity at the commencement of construction. Upon completion of construction of the Proposal, ownership would be transferred to RailCorp and Mascot Substation would be operated and maintained by Sydney Trains.

4 Statutory considerations

Chapter 4 provides a summary of the statutory considerations relating to the Proposal including a consideration of NSW Government polices/strategies, NSW legislation (particularly the EP&A Act), environmental planning instruments, and Commonwealth legislation.

4.1 Commonwealth legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The (Commonwealth) EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places - defined in the EPBC Act as 'Matters of National Environmental Significance (MNES)'. The EPBC Act requires the assessment of whether the Proposal is likely to significantly impact on MNES or Commonwealth land. These matters are considered in full in **Appendix A**.

The biodiversity assessment identified that there would be no significant impact to any threatened ecological community or threatened species as listed under the EPBC Act. The Proposal would not affect any other MNES or Commonwealth land.

Accordingly, a referral to the Commonwealth Minister for the Environment is not required.

4.2 NSW legislation and regulations

4.2.1 Environmental Planning and Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. This Proposal is subject to the environmental impact assessment and planning approval requirements of Division 5.1 of the EP&A Act. Division 5.1 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as TfNSW, which are permissible without development consent.

In accordance with section 5.5 of the EP&A Act, TfNSW, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the Proposal.

Clause 228 of the EP&A Regulation defines the factors which must be considered when determining if an activity assessed under Division 5.1 of the EP&A Act has a significant impact on the environment. **Chapter 6** of the REF provides an environmental impact assessment of the Proposal in accordance with clause 228 and **Appendix B** specifically responds to the factors for consideration under clause 228.

4.2.2 Other NSW legislation and regulation

Table 4.1 provides a list of other relevant legislation applicable to the Proposal.

Table 4.1 Other legislation applicable to the Proposal

Applicable legislation	Considerations
<i>Biodiversity Conservation Act 2016</i> (BC Act) (NSW)	The Proposal site at Mascot does not contain suitable habitat features for threatened flora and fauna. The proposed substation site is located in a highly modified urban. Mascot is a densely urban/commercial/industrial precinct in Sydney. Works at this location is unlikely to affect endangered ecological communities or threatened flora and fauna (refer Section 6.8).

Applicable legislation	Considerations
<i>Biosecurity Act 2015</i> (NSW)	<p>Clause 22 requires that any person who deals with a biosecurity matter has a duty to ensure that in so far as is reasonably practicable, the potential biosecurity risk is prevented, eliminated or minimised.</p> <p>Appropriate management methods would be implemented during construction if priority weeds are encountered (refer to Section 6.8).</p> <p>Under the <i>Biosecurity Regulation 2017</i>, an owner, occupier or person in charge of a premises must notify the presence of a pest or disease listed in Schedule 1 of the Regulation. Notification must be made in accordance with Part 6 of the Regulation and within one working day after the person first suspects or becomes aware of the presence.</p>
<i>Contaminated Land Management Act 1997</i> (CLM Act) (NSW)	<p>Section 60 of the CLM Act imposes a duty on landowners to notify the Department of Planning, Industry and Environment (DPIE), and potentially investigate and remediate land if contamination is above EPA guideline levels.</p> <p>The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.9).</p>
<i>Heritage Act 1977</i> (Heritage Act) (NSW)	<ul style="list-style-type: none"> • Sections 57 and 60 (approval) where items listed on the State Heritage Register are to be affected • Sections 139 and 140 (permit) where relics are likely to be exposed • Section 170 where items listed on a government agency Heritage and Conservation Register are to be affected. <p>The Proposal does not involve works or impacts to listed heritage items.</p>
<i>National Parks and Wildlife Act 1974</i> (NPW Act) (NSW)	<p>Sections 86, 87 and 90 of the NPW Act require consent from DPIE to have an impact upon Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.5).</p> <p>However, if unexpected archaeological items or items of Indigenous heritage significance are discovered during the construction of the Proposal, all works would cease and appropriate advice sought.</p> <p>With the implementation of mitigation measures outlined in Section 7 no impacts to Indigenous heritage would occur as a result of the Proposal.</p>
<i>Protection of the Environment Operations Act 1997</i> (PoEO Act) (NSW)	<p>The Proposal does not involve a ‘scheduled activity’ under Schedule 1 of the PoEO Act. Accordingly, an Environment Protection Licence (EPL) is not required for the Proposal.</p> <p>TfNSW must notify the EPA of any pollution incidents that occur onsite where triggered under Part 5.7 of the PoEO Act. This would be managed in the CEMP to be prepared and implemented by the Construction Contractor.</p>
<i>Roads Act 1993</i> (Roads Act) (NSW)	<p>Section 138 of the Roads Act requires consent from the relevant road authority for the carrying out of work in, on or over a public road. However, clause 5(1) in Schedule 2 of the Roads Act states that public authorities do not require consent for works on unclassified roads.</p> <p>The Proposal may require work on the surrounding road network or temporary occupancy of the road during construction and as such, consent under the Roads Act or a Road Occupancy Licence (ROL) from TfNSW would be sought as required.</p>

Applicable legislation	Considerations
<i>Waste Avoidance and Resource Recovery Act 2001</i> (WARR Act) (NSW)	TfNSW would carry out the Proposal having regard to the requirements of the WARR Act. A site-specific Waste Management Plan would be prepared.
<i>Water Management Act 2000</i> (WM Act) (NSW)	The WM Act requires approval for any water use from a natural source (e.g. aquifer, river), water management works, drainage or flood works, controlled activities or aquifer interference. If during further investigations it is identified that groundwater would need to be extracted, a license would be sought from the NSW Office of Water.

4.3 State Environmental Planning Policies

4.3.1 State Environmental Planning Policy (Infrastructure) 2007

The Infrastructure SEPP is the key environmental planning instrument which determines the permissibility of the Proposal and directs under which part of the EP&A Act an activity or development may be assessed.

Part 2 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other agencies prior to the commencement of certain types of development.

Section 5 of this REF discusses the consultation undertaken according to the requirements of the Infrastructure SEPP.

It is noted that the Infrastructure SEPP prevails over all other environmental planning instruments except where *State Environmental Planning Policy (Major Development) 2005* or *State Environmental Planning Policy (Coastal Management) 2018* applies. The Proposal does not require consideration under these SEPPs and therefore these instruments have not been further considered as part this REF.

4.3.2 State Environmental Planning Policy No 55 – Remediation of Land

State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55) provides a State-wide approach to the remediation of contaminated land for the purpose of minimising the risk of harm to the health of humans and the environment. While consent for the Proposal is not required, the provisions of SEPP 55 have still been considered in the preparation of this REF.

Section 6.9 of this REF contains an assessment of the potential contamination impacts of the Proposal. It is unlikely that any large-scale remediation (Category 1) work would be required as part of the Proposal. The proposed land use does not differ to the existing use and is, therefore, unlikely to be affected by any potential contaminants that exist within the site.

4.4 Local environmental planning instrument and development controls

The Proposal is located within the Bayside LGA. Prior to the amalgamation of Botany Bay Council and Rockdale Council, the Proposal site at Mascot was located within the Botany Bay LGA. As a result, the LEP applicable for this section is the *Botany Bay Local Environmental Plan 2013*. The provisions of the Infrastructure SEPP prevail over Local Environmental Plans (LEPs) prepared by councils for an LGA. However, the provisions of the Botany Bay LEP have been considered.

4.4.1 Botany Bay Local Environment Plan 2013

The Botany Bay LEP is the relevant environmental planning instrument for the Bayside LGA, which includes Mascot. **Table 4.2** summarises the relevant aspects of the Botany Bay LEP applicable to the Proposal. **Figure 1.2** shows the relevant section of the zoning map from the Botany Bay LEP 2013, including the indicative location of the Proposal.

Table 4.2 Relevant provisions of the Botany Bay LEP 2013

Provision description	Relevance to the Proposal
Clause 2.3 – Zone objectives and Land Use Tables	<p>O’Riordan Street is zoned SP2 – Infrastructure, with O’Riordan Street identified as a Classified Road.</p> <p>Bounding the eastern boundary of the proposed Mascot Substation is an area zoned SP2 Infrastructure – Sewerage.</p> <p>The proposed Mascot Substation is zoned B5 Business Development.</p> <p>The Proposal is consistent with the objectives of the SP2-zoned land in which it is located. The Proposal would not substantially affect the land use objectives within other nearby zoned land.</p>
Clause 5.10 – Heritage conservation	<p>Clause 5.10 of the Botany Bay LEP aims to:</p> <ul style="list-style-type: none"> • conserve the environmental heritage of Botany Bay • conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, setting and views • conserve archaeological sites • conserve Aboriginal objects and Aboriginal places of heritage significance. <p>There is no heritage listed items within and adjacent to the Proposal site. A discussion of local heritage is discussed in Section 6.6.</p>
Clause 6.2 – Earthworks	<p>Clause 6.2 aims to ensure that earthworks for which development consent is required would not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.</p> <p>Consideration of the potential impacts and mitigation measures for earthworks for the Proposal is outlined in Section 6.9.</p>
Clause 6.5– Environmentally sensitive land – terrestrial biodiversity	<p>Clause 6.5 aims to maintain terrestrial biodiversity by:</p> <ul style="list-style-type: none"> • protecting native fauna and flora • protecting the ecological processes necessary for their continued existence • encouraging the conservation and recovery of native fauna and flora and their habitats. <p>Although the Proposal does not occur on land classified as ‘Environmentally Sensitive Land’, there are areas immediately west and east of the Proposal that are classified as such. Consideration of the Proposal’s potential impacts upon biodiversity and recommended mitigation measures is outlined in Section 6.8.</p>

Provision description	Relevance to the Proposal
Clause 6.7 – Environmentally sensitive land – riparian land and watercourses	<p>Clause 6.7 aims to protect and maintain water quality within watercourses, the stability of the bed and banks of watercourses, aquatic and riparian habitats and ecological processes within watercourses and riparian areas.</p> <p>Although the Proposal does not occur on land classified as 'Environmentally Sensitive Land', there are areas immediately west and east of the Proposal that are classified as such. Consideration of the Proposal's potential impacts upon biodiversity and recommended mitigation measures is outlined in Section 6.8.</p>

4.5 NSW Government policies and strategies

Table 4.3 provides an overview of other NSW Government policies and strategies relevant to the Proposal.

Table 4.3 NSW Government policies and strategies applicable to the Proposal

Policy/Strategy	Commitment	Comment
<p><i>NSW: Making It Happen</i> (NSW Government, 2015)</p>	<p>In September 2015, the NSW Government announced a series of State Priorities as part of NSW: Making It Happen (NSW Government, 2015). The State Priorities are intended to guide the ongoing actions of the NSW Government across the State, and guide resource allocation and investment in conjunction with the NSW Budget. NSW: Making it Happen focuses on 12 key 'priorities' to achieve the NSW Government's commitments. These priorities range across a number of issues including infrastructure, the environment, education, health, wellbeing and safety in addition to Government services.</p> <p>One of the 12 priorities identified as part of NSW: Making It Happen relates to investment in building infrastructure. The ongoing development and investment in transport infrastructure is identified as part of the wider building infrastructure priority.</p>	<p>The Proposal assists in meeting the priority by assisting in the delivery of infrastructure to support NSW population growth over the next 10 years.</p>
<p><i>Future Transport Strategy 2056</i> (TfNSW, 2018)</p>	<p>Future Transport 2056 is an update of NSW's Long Term Transport Master Plan. It is a suite of strategies and plans for transport to provide an integrated vision for the state.</p> <p>The strategy places the customer at the centre of works undertaken by TfNSW. It includes issue specific and place based supporting plans that seek to integrate transport modes.</p> <p>The strategy outlines six state-wide outcomes</p> <ul style="list-style-type: none"> • customer focused • successful places • a strong economy • safety and performance 	<p>The Program is specifically referenced in the strategy as an example of initiatives to be implemented.</p>

Policy/Strategy	Commitment	Comment
	<ul style="list-style-type: none"> • accessible services • sustainability. 	
<p>Building Momentum State Infrastructure Strategy 2018-2038 (Infrastructure NSW, 2018)</p>	<p><i>The State Infrastructure Strategy 2018-2038</i> is a strategy to plan and fund the infrastructure that the NSW Government delivers over the next 20 years.</p> <p>Public transport is viewed as critical to productivity, expanding employment opportunities by connecting people to jobs, and reducing congestion.</p>	<p>The Proposal invests in public transport, which is key to supporting employment opportunities, connecting people to jobs, and reducing congestion.</p>
<p>South District Plan (Greater Sydney Commission, 2018b)</p>	<p>The <i>South District Plan</i> is a 20-year plan to manage growth in the context of economic, social and environmental matters to achieve the 40-year vision for Greater Sydney.</p>	<p>A key initiative in this plan is the investigation into train improvements on the T4 and T8 Lines to improve capacity and reliability.</p> <p>The MTMS program specifically aims to deliver on this initiative.</p>

4.6 Ecologically sustainable development

TfNSW is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of ecologically sustainable development (ESD). The principles of ESD are generally defined under the provisions of clause 7(4) of Schedule 2 to the EP&A Regulation as:

- the precautionary principle – if there are threats of serious or irreversible damage, a lack of full scientific uncertainty should not be used as a reason for postponing measures to prevent environmental degradation
- intergenerational equity – the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- conservation of biological diversity and ecological integrity – the diversity of genes, species, populations and their communities, as well as the ecosystems and habitats they belong to, should be maintained or improved to ensure their survival
- improved valuation, pricing and incentive mechanisms – environmental factors should be included in the valuation of assets and services.

The principles of ESD have been adopted by TfNSW throughout the development and assessment of the Proposal. **Section 3.1.4** summarises how ESD would be incorporated in the design development of the Proposal. **Section 6.13** includes an assessment of the Proposal on climate change and sustainability, and **Section 7.2** lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.

5 Community and stakeholder consultation

Chapter 5 discusses the consultation undertaken to date for the Proposal and the consultation proposed for the future. This chapter discusses the consultation strategy adopted for the Proposal and the results of consultation with relevant government agencies and stakeholders. **Figure 5.1** shows the planning approval and consultation process for the Proposal.

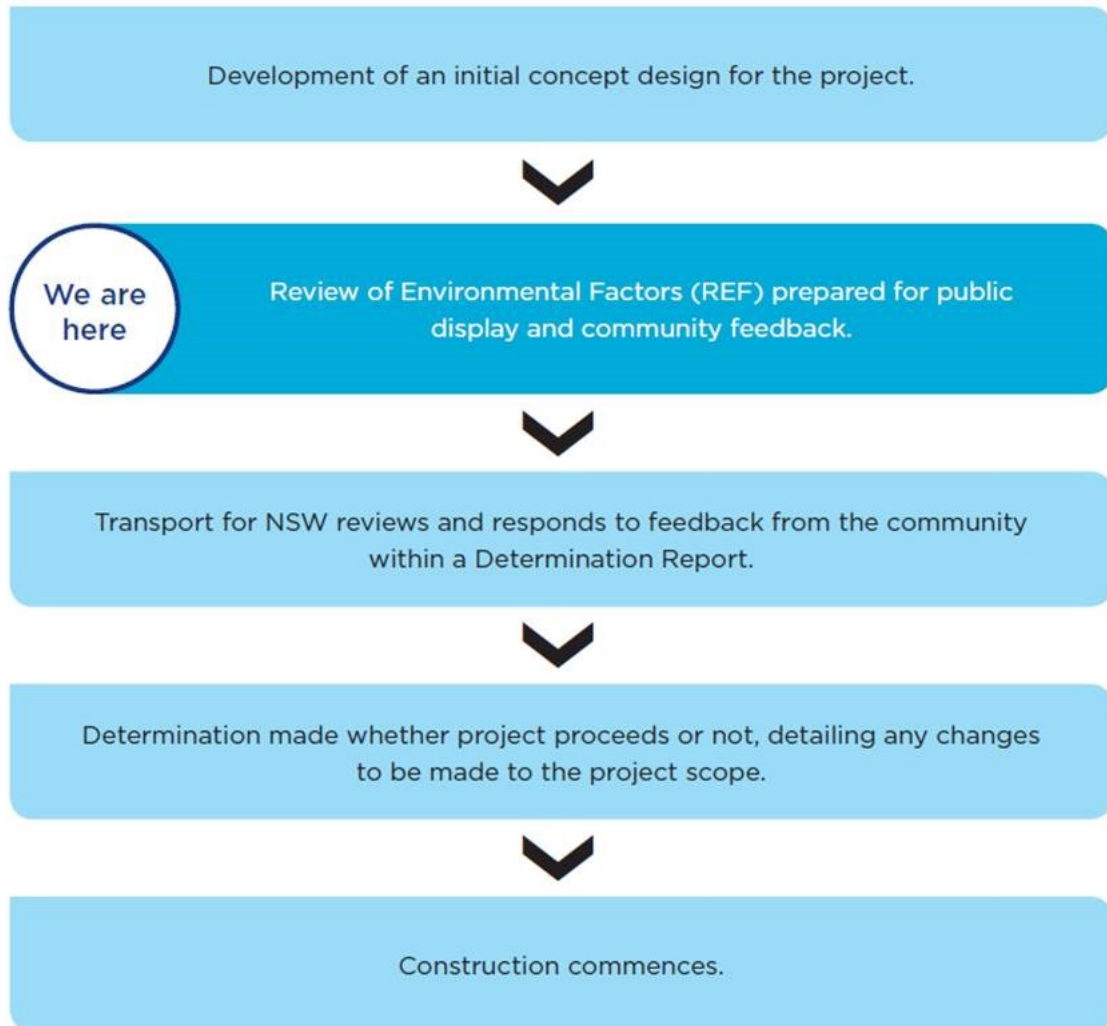


Figure 5.1 Planning approval and consultation process for the Proposal

5.1 Stakeholder consultation during concept design

Throughout the concept design phase stakeholders have been engaged proactively. Stakeholders relevant to the design phase have included TfNSW (including the former RMS), Axicom, Sydney Water, Ausgrid and Sydney Trains. As the project progresses further stakeholders may be engaged such as the nearby residents, school and business owners.

Throughout the design process there has been regular meetings with the Design Management Team and Electrical Team.

A record of the engagement with stakeholders and the topics discussed has been included in **Table 5.1** below.

Table 5.1 Stakeholder engagement undertaken for the Proposal

Stakeholder	Type of engagement	Date	Topics discussed
TfNSW and Sydney Trains Aurecon	Workshop	28 June 2019	System planning/maximum demand workshop
TfNSW, Caldis Cook Architects, Aurecon and Sydney Trains	Workshop	5 July 2019	Security Risk workshop
TfNSW, Caldis Cook Architects, Aurecon and Sydney Trains	Workshop	11 July 2019	Mascot Substation, feeders and 1500V DC arrangement presentation and workshop
TfNSW, RPS, ACDC, Caldis Cook Architects and Aurecon	Workshop	18 July 2019	Constructability workshop
TfNSW, Caldis Cook Architects, Aurecon and Sydney Trains	Workshop	25 July 2019	Safety in design workshop
Axicom, TfNSW and Aurecon	Meeting	31 July 2019	Meeting with Telecom Tower (Axicom owner)
TfNSW and Aurecon	Meeting	Weekly	Weekly technical meetings with TfNSW

5.2 Consultation requirements under the Infrastructure SEPP

Part 2, Division 1 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Clauses 13, 14, 15, 15AA, 15A and 16 of the Infrastructure SEPP require that public authorities undertake consultation with councils and other agencies, when proposing to carry out development without consent.

Table 5.2 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.

Table 5.2 Infrastructure SEPP consultation requirements

Clause	Clause particulars	Relevance to the Proposal
Clause 13 Consultation with Councils – development with impacts on council related infrastructure and services	<p>Consultation is required where the Proposal would result in:</p> <ul style="list-style-type: none"> substantial impact on stormwater management services generating traffic that would place a local road system under strain involve connection to or impact on a council owned sewerage system involve connection to and substantial use of council owned water supply 	<p>The Proposal includes include works that would:</p> <ul style="list-style-type: none"> impact stormwater management services disrupt pedestrian movement impact the state road of O’Riordan Street and Bourke Road. <p>Consultation with Bayside Council has been undertaken and would continue throughout the detailed design and construction phases.</p>

Clause	Clause particulars	Relevance to the Proposal
	<ul style="list-style-type: none"> significantly disrupt pedestrian or vehicle movement involve significant excavation to a road surface or footpath for which Council has responsibility. 	<p>Consultation with TfNSW (formerly Roads and Maritime Services) has been undertaken and would continue throughout the detailed design and construction phases.</p> <p>Formal notification of the works in accordance with the Infrastructure SEPP would be provided to Bayside Council.</p>
Clause 14 Consultation with Councils – development with impacts on local heritage	<p>Where works:</p> <ul style="list-style-type: none"> substantially impact on local heritage item (if not also a State heritage item) substantially impact on a heritage conservation area. 	<p>Direct physical impacts would not occur to any local heritage item or conservation area.</p> <p>As such, no formal notification of the works would be required for Bayside Council.</p> <p>Refer to Section 6.6.</p>
Clause 15 Consultation with Councils – development with impacts on flood liable land	<p>Where works:</p> <ul style="list-style-type: none"> impact on land that is susceptible to flooding – reference would be made to <i>Floodplain Development Manual: the management of flood liable land</i>. 	<p>The Proposal is not located on land that is susceptible to flooding. Accordingly, consultation with Council is not required in regard to this aspect. Refer to Section 6.10.</p>
Clause 15AA Consultation with State Emergency Service development with impacts on flood liable land	<p>Consultation is required with the NSW State Emergency (SES) where the Proposal would be developed on flood liable land, defined as the probable maximum flood extent.</p>	<p>The Proposal is not located within the mapped probable maximum flood extent as outlined in the Mascot, Rosebery and Eastlakes Flood Study. Consultation with the SES is therefore not required. Refer to Section 6.10.</p>
Clause 15A Consultation with councils – development with impacts on certain land within the coastal zone	<p>Consultation is required where the Proposal would be undertaken on land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land.</p>	<p>The Proposal is not located on land within a coastal vulnerability area. Consultation with Council is therefore not required.</p>
Clause 16 Consultation with public authorities other than Councils	<p>For <i>specified development</i> which includes development that is undertaken adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i>, consultation with the DPIE Energy, Environment and Science Group is required. Consultation with other agencies is required when specified by the Infrastructure SEPP.</p>	<p>The Proposal is not located adjacent to or on, and is not for the purpose of, any of the listed six land uses and/or purposes of Clause 16.</p> <p>Consultation with the applicable public authorities is not required.</p>

5.3 Consultation strategy

The consultation strategy for the Proposal was developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the

project team. The consultation strategy that was developed, having regard to the requirements of the planning process, ensures that stakeholders, customers and the community are informed of the Proposal and have the opportunity to provide input.

The objectives of the consultation strategy are to:

- provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- raise awareness of the various components of the Proposal and specialist environmental investigations
- keep the local community and stakeholders informed of the proposed upgrade work and encourage direct communication/identification of issues, concerns or suggestions
- engage with directly affected community members near the Proposal Area to understand opportunities to minimise impacts on their amenity, properties and business operations
- provide opportunities for stakeholders and the community to express their views about the Proposal
- listen and record community and stakeholder feedback and ensure it is considered during the development of the Proposal and responded to in the Determination Report
- work collaboratively with statutory regulators/authorities to facilitate the environmental approval process
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach
- identify and resolve issues in a timely manner.

5.4 Public display

The REF display includes:

- public display of the REF at various locations
- distribution of a project update to the local community and key stakeholders outlining the Proposal and inviting feedback on the REF
- signage at the station to promote the proposed work to the local community and rail customers, outlining the Proposal and inviting feedback on the REF
- advertisement of the REF public display in local newspapers (Southern Courier and the St George and Sutherland Shire Leader) with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
- consultation with Bayside Council, Sydney Trains, NSW TrainLink, TfNSW (formerly Roads and Maritime Services) and other key stakeholders.

Community consultation activities for the Proposal would be undertaken during the public display of this REF. The display period of the REF would be advertised in the week that the public display commences. The REF would be displayed for a period of two weeks.

The REF would be placed on public display at the following locations:

- Mascot Library, 2 Hatfield Street, Mascot
- Transport for NSW Office, 241 O'Riordan Street, the Gateway, Mascot.

The REF would also be available on the [TfNSW website](#)¹ and [Have Your Say website](#)². Information on the Proposal would be available through the Project Infoline (1800 684 490) or by [email](#)³. During this time feedback is invited. Following consideration of feedback received during the public display period, TfNSW would determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

5.5 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW would acknowledge receipt of feedback from each respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal.

Should TfNSW determine to proceed with the Proposal, the Determination Report would be made available on the TfNSW website and would summarise the key impacts identified in this REF, demonstrate how TfNSW considered issues raised during the public display period, and include a summary of mitigation measures proposed to minimise the impacts of the Proposal.

Should TfNSW determine to proceed with the Proposal, the project team would keep the community, council and other key stakeholders informed of the process, identify any further issues as they arise, and develop additional mitigation measures to minimise the impacts of the Proposal. The interaction with the community would be undertaken in accordance with a Community Liaison Management Plan to be developed prior to the commencement of construction.

¹ <http://www.transport.nsw.gov.au/projects/mtms>

² <https://www.nsw.gov.au/improving-nsw/have-your-say/>

³ projects@transport.nsw.gov.au

6 Environmental impact assessment

Chapter 6 of the REF provides a detailed description of the likely environmental impacts associated with the construction and operation of the Proposal. For each likely impact, the existing environment is characterised and then an assessment is undertaken as to how the Proposal would affect the existing environment.

This environmental impact assessment has been undertaken in accordance with clause 228 of the EP&A Regulation. A checklist of clause 228 factors and how they have been specifically addressed in this REF is included at **Appendix B**.

6.1 Traffic and transport

This section assesses and describes the impacts of the proposal on traffic, transport and pedestrian and cyclist access surrounding the Proposal site. This assessment is based on a desktop analysis. Detailed traffic counts and modelling were not considered necessary as the Proposal is focused on the proposed substation area. As such, it is unlikely to have a major impact on the surrounding road network.

6.1.1 Existing environment

Mascot Substation at 166 O’Riordan Street

The proposed location for the Mascot Substation is located at 166 O’Riordan Street, Mascot and is only accessible via O’Riordan Street. Entry to the site would be via an existing driveway. There is no stopping or parking on O’Riordan Street.

Road network and traffic

Mascot Substation is situated on O’Riordan Street. The part of O’Riordan Street adjacent to the substation is a State road and is managed by TfNSW (formerly Roads and Maritime Services). O’Riordan Street connects to Qantas Drive and Joyce Drive to the south which links to Sydney Kingsford Smith International Airport. To the north, O’Riordan Street intersects with Gardeners Road, which connects with Anzac Parade which provides a connection to the eastern suburbs such as Kingsford, Kensington and Moore Park.

Parking

There is no parking permitted along O’Riordan Street. There is timed street parking is available along John Street and Coward Street.

Bus services

The nearest bus stops to the Proposal are located on the north and south-bound side of Bourke Street, outside the Mascot Station and the two other bus stops are located on Coward Street.

On Bourke Road, there are two bus stops located on the north and south-bound side. These bus stops accommodate services from Mascot Stamford Hotel to Redfern.

Pedestrian facilities

Council managed pedestrian pathways are located within the vicinity of the Proposal.

6.1.2 Potential impacts

Construction phase

Pedestrians and cyclists

Construction of the Proposal is expected to cause temporary disruptions to existing pedestrian facilities. The Proposal would generate additional heavy vehicle traffic within the local road network which could also present an increased safety risk to pedestrians and cyclists.

Disruptions during construction have the potential for increased safety risks for cyclists and pedestrians due to the potential interactions with construction plant and vehicles. Impacts to cyclists and pedestrians during construction would be managed through the development of a construction Traffic Management Plan (TMP) and associated Traffic Control Plans (TCP) by the Construction Contractor.

Over an anticipated 22 month construction period would be required to facilitate the Proposal.

Road network and traffic

The Proposal would generate additional traffic in the local area during construction. The number of construction vehicles would fluctuate depending on the construction stage. Vehicle types are expected to generally consist of light vehicles from construction workers and heavy vehicles for delivery and removal of materials, plant and equipment.

The number of construction vehicles have been estimated as:

- 70 light vehicle movements during the daytime and night-time periods
- 30 heavy vehicle movements during the daytime and night-time periods.

Minor temporary increases in traffic would also arise due to:

- delivery of construction materials, plant and equipment
- movement of construction personnel.

Regular bus services in the vicinity of the Proposal would not be affected during construction and would continue to operate as normal.

Construction vehicle routes

O’Riordan Street would serve construction vehicles travelling to Mascot Substation. Construction vehicles would be limited to ‘left in, left out’ from/onto O’Riordan Street.

Parking

There is the potential that construction staff may utilise existing nearby on-street parking during the construction phase. TfNSW would endeavour to minimise impacts to on-street parking by providing parking for construction staff in proximity to the Proposal Area where possible. Construction workers would also be encouraged to car-pool or utilise public transport services where and when available.

Overall, with the current availability of on-street and off-street parking surrounding the Proposal site, the impact of a decrease in availability of on-street parking in the short term would be minor.

Operational phase

A summary of the operational traffic, transport and access impacts is presented below.

Mascot Substation

The introduction of the new substation would require the need for staff to access the site for ongoing operational and maintenance purposes, however this is not considered to have an impact on the surrounding road network.

Pedestrians and cyclists

The Proposal would not alter the existing pedestrian or cycling network surrounding the substation.

Public transport

The Proposal does not include changes to bus/rail services as part of the works and would not impact on the operation (service operation or timetabling) of public transport in the vicinity of the Proposal.

Road network and traffic

The number of vehicles required to operate the proposal would be minimal (less than five per day). The Proposal would not substantially alter the existing surrounding road network or traffic levels.

Parking

The proposal would not add or remove any parking spaces.

The Proposal may induce the requirement for additional cleaning, maintenance or security staff at the substation, however this would not increase demand for on-street parking given that the substation would provide parking within the site.

6.1.3 Mitigation measures

The following mitigation measure would apply to the Proposal:

- a construction TMP would be prepared by the Construction Contractor in consultation with TfNSW and provided to Bayside Council and TfNSW. The construction TMP would be the primary tool to manage potential traffic and pedestrian impacts associated with construction. At a minimum, the construction TMP would include:
 - ensuring adequate signage at construction work sites
 - consideration of safety and accessibility for pedestrians and cyclists
 - ensuring adequate sight lines to allow for safe entry and exit from the site
 - managing impacts and changes to on and off-street parking, and parking locations for construction workers
 - routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses
 - measures to manage traffic flows around the area affected by the Proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the TMP
- access to local businesses and residential properties would be maintained at all times (unless affected property owners have been consulted and appropriate alternative arrangements made)
- consultation with the relevant road authorities would be undertaken during preparation of the construction TMP. The performance of all project traffic arrangements would be monitored during construction

- communication would be provided to the community and local residents to inform them of changes to parking, pedestrian access and/or traffic conditions including vehicle movements and anticipated effects on the local road network relating to site works
- heavy vehicle movements required as part of construction of the Proposal near Mascot Public School would be restricted during peak times and school zone hours. It may also be necessary to undertake other construction activities, such as concrete pours, crane lifts and delivery of oversized materials, outside standard construction hours to minimise traffic disruption
- access for emergency vehicles would be maintained in accordance with relevant requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.2 Landscape and visual amenity

A Landscape Character and Visual Impact Assessment was prepared by AECOM for the Proposal (AECOM, 2019). The assessment included desktop analysis, site inspection, visual envelope mapping, creation of photomontages and detailed impact assessment. The findings of the assessment are summarised in this section.

There is no accepted National published guidance on LVIA specific to Australia. Therefore, the industry typically refers to guidance from elsewhere for producing LVIA. The method for this assessment has been developed with reference to Guidelines for Landscape and Visual Impact Assessment (GLVIA3), Third Edition (2013), developed by the Landscape Institute and Institute for Environmental Management (UK). GLVIA3 is widely recognised as comprising an example of ‘best practice’ in this field. In accordance with this guideline, an impact grading matrix was used to assess both landscape and visual impacts. The sensitivity and magnitude of the impact was determined to produce a combined impact rating of negligible, low, moderate-low, moderate, high-moderate and high (refer to **Table 6.1**).

Table 6.1 Landscape character and visual impact grading matrix

Sensitivity	Magnitude			
	High Change	Moderate Change	Low Change	Negligible change
High	High	High-moderate	Moderate	Negligible
Moderate	High-moderate	Moderate	Moderate-low	Negligible
Low	Moderate	Moderate-low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

6.2.1 Existing environment

Landscape character

Located approximately seven kilometres south of Sydney’s central business district (CBD), Mascot contains both the international and domestic terminal of Sydney Airport. The area surrounding the Proposal contains a mixture of industrial, residential and commercial development. Sydney Airport is a key influencer in the area, with many of the neighbouring commercial buildings catering to its needs. A majority of the land within the study area is

zoned B5 Business Development, including the Proposal site. The primary objective of B5 is 'to enable a mix of business and warehouse uses, and specialised retail premises that require a large floor area, in locations that are close to, and that support the viability of centres' (Botany Bay LEP 2013). The Proposal site contains little vegetation, being a highly urbanised/industrial environment. Vegetation is typically limited to street trees and landscaping within the streetscape.

Landscape Character Zones (LCZ) have been identified within the broader setting of the site. The LCZs that fall within the Proposal Area are listed and described in **Table 6.2**.

Table 6.2 Landscape Character Zones within the Proposal Area

LCZ	Description
LCZ 1 – Industrial	LCZ 1 typically comprises large lots with large, low industrial buildings, often set back from the street by car parking areas. While this development typically contains minimal landscaping, within the study area some lots contain landscaping within car parking areas and adjacent to buildings. Street trees within the LCZ are mature eucalypt trees and some smaller native trees.
LCZ 2 – Road Corridor	LCZ 2 comprises of road corridors and includes O’Riordan Street and Bourke Road. Mature street trees are often included within the road corridor, e.g. <i>Ficus microcarpa var. hillii</i> at the intersection of Bourke Road and O’Riordan Street. Commercial, mixed use and residential roads typically contain a higher proportion of landscaping within the corridor, while industrial areas typically contain less.
LCZ 3 – Commercial	The close proximity of Mascot to Sydney Airport, especially to the domestic terminal, has heavily influenced the businesses in the area. The majority of commercial uses in the study area consist of accommodation that caters to commuters from the nearby airport such as the Holiday Inn, Pullman Sydney Airport and Ibis Hotels. This LCZ is characterised by tall, typically architecturally modern buildings with a large front, landscaped setback and rear parking areas.
LCZ 4 – Residential	The proximity of residential development to main roads determines the density of development, with higher density residential (including mixed use buildings) closer to main roads and low density residential further away.

Visual receivers

Visual receivers are individuals and/or groups of people whose views may be affected by the Proposal. These include users of residential dwellings, commercial properties, community facilities, road corridors and pedestrian footpaths.

The area from which the Proposal can be seen is relatively small, broadly comprising:

- views from the vehicular, pedestrian and bicycle commuters along O’Riordan Street
- views from the commercial buildings nearby
- views from workers in the industrial lots nearby.

Visibility of the Proposal from the surrounding area is substantially limited due to:

- the tall, rectangular built form surrounding to the Proposal
- the dense vegetation screening by the *Ficus microcarpa var. hillii* street trees
- the limited amount of publicly accessible land surrounding the Proposal.

Visual effects of the Proposal are assessed for the following key visual receptors:

- visitors staying in nearby hotels
- road users, including vehicular commuters, and to some extent, pedestrians and cyclists
- local workers in the industrial lots nearby.

6.2.2 Potential impacts

Construction phase

Typical visible construction elements within the proposed substation site are likely to comprise a range of site offices, hoardings, plant and equipment as detailed in **Section 3.1.6**. This equipment would include (but is not limited to), a bobcat, an excavator, front end loaders, concrete pumps and a piling rig, as well as light and heavy vehicles transporting materials and equipment to and from the site.

The construction compound/laydown would be located within the same parcel where the substation building would be constructed.

Construction impacts would be visually and physically confined within the proposed substation site boundary and would be screened from some of the more sensitive receptors by existing mature vegetation and potentially from the heavy flow of traffic from the adjacent road corridor. The visual impact would occur over a period of about two years until completion of the Proposal.

Changes seen within the proposed substation site would be visually screened by surrounding built form and street trees. Hoardings surrounding the site would screen views to internal site works.

Operational phase

Landscape Character Assessment

An assessment of landscape character impact at operation arising from the Proposal has been undertaken for each Landscape Character Zone (LCZ). This assessment showed that all LCZs (as described in **Table 6.2**) were subject to no change or negligible change from the Proposal. A summary of potential impacts to landscape character, utilising the impact grading matrix above, is provided in **Table 6.3**.

Table 6.3 Impacts to landscape character zones

Zone	Anticipated change	Sensitivity to change	Magnitude of change	Significance of Impact
LCZ 1 – Industrial	The anticipated change would consist of a new substation building within 166 O’Riordan Street, Mascot.	<p>The susceptibility of LCZ 1 to change due to the Proposal is influenced by:</p> <ul style="list-style-type: none"> the landscape is utilitarian in character, with function as the primary driver of overall design. the LCZ does not contain items of heritage value, nor does it have high visual amenity or ecological values. the LCZ is predominantly zoned B5 Business Development (to enable a mix of warehouse and business uses), with the majority of the remaining zoned as SP2 Infrastructure. The existing character conforms to the existing uses of industrial development. <p>The LCZ has a low level of landscape value due to the broader, utilitarian industrial character of the LCZ and the low level of landscape amenity provided along the neighbouring road corridor.</p> <p>Due to the above the sensitivity of LCZ 1 to the anticipated change is considered to be <i>Low</i>.</p>	<p>The Proposal would be of comparable scale and character to that of existing infrastructure and industrial development within the LCZ.</p> <p>The geographical extent of the area over which the effects of the Proposal may have an influence is at the level of the immediate setting of the site and there would be no loss of significant landscape elements.</p> <p>The duration of the Proposal would be long-term (50-60 years), with low potential for reversibility.</p> <p>Due to the above the magnitude of change for LCZ 1 is considered to be <i>Low</i>.</p>	The impact of the Proposal on LCZ 1 is considered to be <i>Low (adverse)</i> , therefore the Proposal would not result in a significant change to the overall character of the LCZ.

Zone	Anticipated change	Sensitivity to change	Magnitude of change	Significance of Impact
LCZ 2 – Road corridor	<p>No changes would occur within this LCZ. The Proposal would be set back from the road corridor at a similar distance to other development.</p> <p>As no changes lie within or adjacent to this LCZ, the sensitivity and magnitude to the Proposal is considered to be <i>Negligible</i>.</p>	N/A	N/A	The impact of the Proposal on LCZ 2 at operation is considered to be <i>Negligible</i> , therefore the Proposal would not result in a significant change to the overall character of the LCZ.
LCZ 3 – Commercial	<p>The closest part of LCZ 3 is located approximately 30 metres west of the Proposal and is separated by a major road corridor. No changes occur within this LCZ.</p> <p>As no changes lie within or adjacent to this LCZ, the sensitivity and magnitude to the Proposal is considered to be <i>Negligible</i>.</p>	N/A	N/A	The impact of the Proposal on LCZ 3 at operation is considered to be <i>Negligible</i> , therefore the Proposal would not result in a significant change to the overall character of the LCZ.
LCZ 4 - Residential	<p>The closest part of LCZ 4 is located approximately 100 metres south of the Proposal and is separated by industrial development and a road corridor. No changes occur within or adjacent to this LCZ, with changes occurring within LCZ 1.</p> <p>As no changes lie within or adjacent to this LCZ, the sensitivity and magnitude to the Proposal is considered to be <i>Negligible</i>.</p>	N/A	N/A	The impact of the Proposal on LCZ 4 at operation is considered to be <i>Negligible</i> , therefore the Proposal would not result in a significant change to the overall character of the LCZ.

Visual Impact Assessment

To assess potential operational impacts as a result of the Proposal, two visual receptor locations (viewpoints) were selected. Visual receptor locations (viewpoints) are shown in **Figure 6.1**. The rationale for choice of visual receptor locations is as follows:

- Viewpoint 1 – The Pullman Sydney Airport Hotel lies directly west of the Proposal, with this viewpoint representing hotel visitors, vehicular road users, pedestrians and cyclists
- Viewpoint 2 – Bourke Road is the closest intersection to the Proposal, and is representative of the view seen by pedestrians, cyclists, and vehicles at the intersection and workers in surrounding industrial developments. This view also acts as a proxy for the visitors and workers at the Holiday Inn Sydney Airport, although their actual views would be obstructed by the mature vegetation (Fig trees) along Bourke Road.

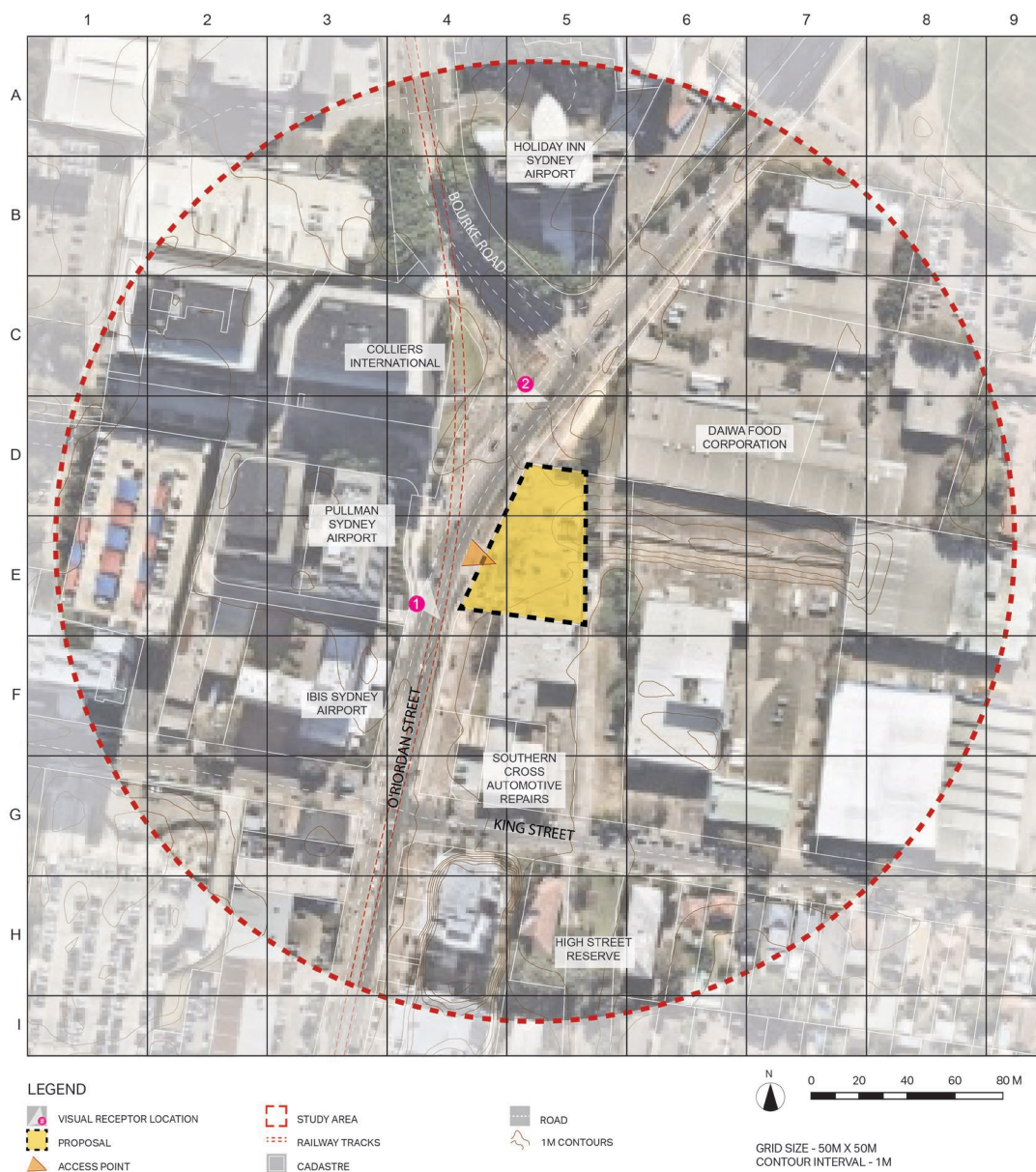


Figure 6.1 Locations of visual receptors (viewpoints)

[Viewpoint 1 - Pullman Sydney Airport Hotel](#)

This viewpoint represents the view seen by visitors and workers from the Pullman Sydney Airport Hotel. The view seen from the driveway entrance to the hotel would have the clearest view of the Proposal from a publicly accessible location. The visual receptors at this location also include road users, and to a lesser extent, pedestrians and cyclists. **Table 6.4** summarises visual impact to these receivers.

Table 6.4 Viewpoint 1 - Pullman Sydney Airport Hotel - visual impact assessment

Viewpoint 1
<p>Existing view</p> <p>This view is taken from in front of the Pullman Sydney Airport Hotel, at the entrance of the driveway on O’Riordan Street. Key elements of the existing view comprise:</p> <ul style="list-style-type: none">• the road corridor with four lanes of traffic in the foreground, taking up a majority of the view• vegetation within the road verge seen in the fore to middle ground of the view• overhead powerlines and street lighting in the middle to background of the view• the rectilinear built form of the Holiday Inn Sydney Airport is seen in the background to the left of frame• assorted industrial buildings along the road corridor, particularly in the mid-ground to the right of frame• construction activity on both sides of the road are seen in the fore, middle, and background of the view, including concrete barriers, safety fencing, plant and equipment, traffic diversion signs, and safety signage.
<p>Anticipated change to view</p> <p>The key changes to the view would comprise:</p> <ul style="list-style-type: none">• the proposed Mascot Substation would be seen in the background of the view at the culmination of the road corridor• if street trees were to be planted within the road corridor adjacent to the proposed substation, these, along with any other landscaping, would be seen.
<p>Sensitivity to change</p> <p>From this viewpoint the changes due to the Proposal would be seen by:</p> <ul style="list-style-type: none">• visitors and workers of the Pullman Sydney Airport Hotel• road users on O’Riordan Street• pedestrians and cyclists along O’Riordan Street. <p>Due to the heavy traffic and ongoing construction activity within the road corridor, road users at this location are expected to have their attention focussed on driving, particularly considering the constantly changing traffic conditions. The view to the Proposal would be one glance view within their wider journey and they would be expected to give their surroundings a cursory glance rather than an in-depth gaze. Pedestrians and cyclists are likely to give their surrounding the same level of attention, and it is expected that there would be a lesser volume of these travellers compared to vehicles.</p> <p>Workers within the Pullman Sydney Airport Hotel are also expected to give a low amount of attention the landscape outside the hotel grounds, as their attention would likely be focussed on their daily work activities. Visitors of the Pullman Sydney Airport Hotel are likely to be short term stays due to the nature of accommodation near the airport and within an industrial area, so the level of attention that visitors would give to their surroundings would be low.</p> <p>The value attached to Viewpoint 1 is anticipated to be low given the nearby industrial land use, heavy traffic and ongoing roadworks, and lack of scenic qualities.</p> <p>Due to the above, the sensitivity of the visual receptor (Viewpoint 1) to the anticipated change in the view arising from the Proposal is considered to be <i>Low</i>.</p>

Viewpoint 1

Magnitude of change

The of change likely to be experienced within the view would be influenced by the following:

- there would be complete removal of all vegetation within three metres of the substation site
- the proposed substation would be visually in keeping with existing built form of the surrounding industrial area
- the proposed substation and access road would comprise primarily of a dark grey concrete, which is visually consistent with the existing materiality of the neighbouring industrial and commercial buildings
- the proposed substation would result in an additional built form adjacent to the road corridor on a currently undeveloped site.

The Proposal would result in the addition of a moderately large building comparable to surrounding industrial buildings within the middle ground of the view.

The duration of the Proposal would be long-term (50-60 years), with low potential for reversibility.

Due to the above, the magnitude of visual effects arising from the Proposal is considered to be *Moderate*.

Significance of visual effect

The significance of the visual effects arising from the Proposal on Viewpoint 1 would be *Moderate to Low (adverse)*. The quality of the architecture of the substation and the landscape surrounding the proposed building could raise the qualitative rating for the change to positive, i.e. an attractive building and landscaping could result in a positive addition to the view.

Viewpoint 2 - Bourke Road

This viewpoint represents the view seen by road users (including pedestrians, cyclists and vehicles) travelling through the intersection of Bourke Road and O’Riordan Street, and workers within industrial properties nearby. This view also acts as a proxy for the visitors and workers at the Holiday Inn Sydney Airport, although their actual views would be obstructed by the mature vegetation along Bourke Road. **Table 6.5** summarises visual impact to these receivers.

Table 6.5 Viewpoint 2 - Bourke Road - visual impact assessment

Viewpoint 2

Existing view

This viewpoint is at the intersection of Bourke Road and O’Riordan Street at the pedestrian crossing, looking south along O’Riordan Street (refer to *Figure 19*). Key elements within the existing view comprise:

- the road corridor with four lanes of traffic in the foreground, taking up a majority of the view
- the road verge, including a small amount of vegetation, seen in the middle to background of the view
- overhead powerlines and street lighting in the middle to background of the view
- a large, rectangular commercial building in the middle ground to the right of frame
- assorted industrial buildings fronting the road corridor
- construction activity on both sides of the road are seen in the fore, middle, and background of the view, including concrete barriers, safety fencing, plant and equipment, traffic diversion signs, and safety signage.

Anticipated change to view

The key changes to the view would comprise:

Viewpoint 2

- the proposed Mascot Substation would be seen in the background of the view at the culmination of the road corridor
- if street trees were to be planted within the road corridor adjacent to the proposed substation, these, along with any other landscaping, would be seen.

Sensitivity to change

From this viewpoint the changes due to the Proposal would be seen by:

- pedestrians and cyclists along O’Riordan Street
- vehicles queueing at or passing through the intersection of Bourke Road and O’Riordan Street
- workers in the nearby industrial lots.
- visitors and workers at the Holiday Inn Sydney Airport.

As with Viewpoint 1, due to the heavy traffic and ongoing construction activity within the road corridor, road users at this location are expected to have their attention focussed on driving. The view to the Proposal would be one glance view within their wider journey and they would be expected to give their surroundings a cursory glance rather than an in-depth gaze. Pedestrians and cyclists are likely to give their surrounding the same level of attention, and it is expected that there would be a lesser volume of these travellers compared to vehicles.

Workers within the industrial lots and Holiday Inn Sydney Airport are also expected to give a low amount of attention the landscape outside the hotel grounds, as their attention would likely be focussed on their daily work activities. Visitors of the Pullman Sydney Airport Hotel are likely to be short term stays due to the nature of accommodation near the airport and within an industrial area, so the level of attention that visitors would give to their surroundings would be low.

The value attached to Viewpoint 2 is anticipated to be low given the nearby industrial land use, heavy traffic and ongoing roadworks, and lack of scenic qualities.

Due to the above, the sensitivity of the visual receptor (Viewpoint 1) to the anticipated change in the view arising from the Proposal is considered to be *Low*.

Magnitude of change

The of change likely to be experienced within the view would be influenced by the following:

- there would be complete removal of all vegetation surrounding the substation site
- the proposed substation would be visually absorbed by the surrounding industrial landscape
- the proposed substation and access road would comprise primarily of a dark grey concrete, which is visually consistent with the existing materiality of the neighbouring industrial and commercial buildings
- the proposed substation would result in an additional built form adjacent to the road corridor on a currently undeveloped site.

The Proposal would be an additional moderately scaled building comparable to surrounding industrial buildings. There would be no loss of views to surrounding areas from this location.

The duration of the Proposal would be long-term (50-60 years), with low potential for reversibility.

Due to the above, the magnitude of visual effects arising from the Proposal is considered to be *Low*.

Significance of visual effect

The significance of the visual effects arising from the Proposal on Viewpoint 2 would be *Low* (neutral).

6.2.3 Mitigation measures

The following mitigation measure would apply to the Proposal:

- establish TPZs around trees to be retained. Tree protection would be undertaken in keeping with AS 4970-2009 *Protection of Trees on Development Sites* and would include exclusion fencing of TPZs
- provide well-presented and maintained construction hoarding and site fencing with shade cloth (or similar material) (where necessary) to minimise visual impacts on key view points during construction and remove hoardings and site fencing following the completion of construction. Hoardings and site fencing would be removed following construction completion
- provide cut-off or directed lighting to be used with and outside of the construction site, with lighting location and direction considered to ensure glare and light spill is minimised
- construction personnel to keep the construction areas clean and tidy including refuse placed in appropriate receptacles
- measures taken to ensure no tracking of dirt and mud into public roads and other public spaces
- to minimise visual impacts to the Proposal during operational activities, the following measures would be implemented:
 - ongoing maintenance and repair of constructed elements
 - ongoing maintenance of vegetation, both surrounding and within the Proposal
 - removal of graffiti in accordance with Sydney Trains maintenance requirements.

For a full list of additional mitigation measures, refer to the Landscape Character and Visual Impact Assessment in **Appendix C**.

6.3 Noise and vibration

A Noise and Vibration Impact Assessment (**Appendix D**) (AECOM, 2019) was completed for the proposal and included the following scope:

- establish the noise management levels and vibration limits that would apply to the Proposal
- identification of predicted environmental noise and vibration levels at nearby residential and other sensitive receivers due to the construction and operation of the Proposal
- identification of predicted noise levels from additional off-site construction traffic generated by the Proposal
- recommend mitigation measures, where necessary, to reduce and manage noise and vibration impacts from the Proposal to comply with established noise management levels and vibration limits.

The findings of this assessment are summarised below.

6.3.1 Existing environment

The Proposal is located at 166 O’Riordan Street, Mascot, an area comprising commercial and industrial uses. Residences are located approximately 100 metres to the south and further to the east.

The acoustic environment is considered to be typically urban, comprising mainly road and air traffic noise.

An overview of the Proposal Area showing the noise monitoring location and assessment receivers is shown in **Figure 6.2** below.

Receivers

Residential and non-residential receivers potentially affected by the construction and operation of the Proposal have been identified within the Proposal Area (refer to **Figure 6.2**). Receivers comprise high density multi-storey residential and low density residential properties located within the suburb of Mascot.

To provide a comprehensive assessment of the operation of the Proposal, seven representative residential receivers, four commercial receivers and two hotel receivers surrounding the Proposal, as listed in **Table 6.6**, have been selected. These receivers were selected as the potentially worst affected receivers.

It is noted that other residential and non-residential sensitive receivers which could potentially be affected by the Proposal are also located in the vicinity of the Proposal, however as noted above, noise impacts have been assessed at the representative worst-affected receivers presented in **Table 6.6**.

Table 6.6 Representative residential receiver addresses

Receiver ID	Receiver address
R1	70 MacIntosh Street, Mascot
R2	243-245 King Street, Mascot
R3	310 King Street, Mascot
R4	312 King Street, Mascot
R5	314 King Street, Mascot
R6	318 King Street, Mascot
R7	330 King Street, Mascot
N1	189 O'Riordan Street, Mascot
N2	154 O'Riordan Street, Mascot
N3	263 King Street, Mascot
N4	176 O'Riordan Street, Mascot
H1	205-209 O'Riordan Street, Mascot
H2	191 O'Riordan Street, Mascot

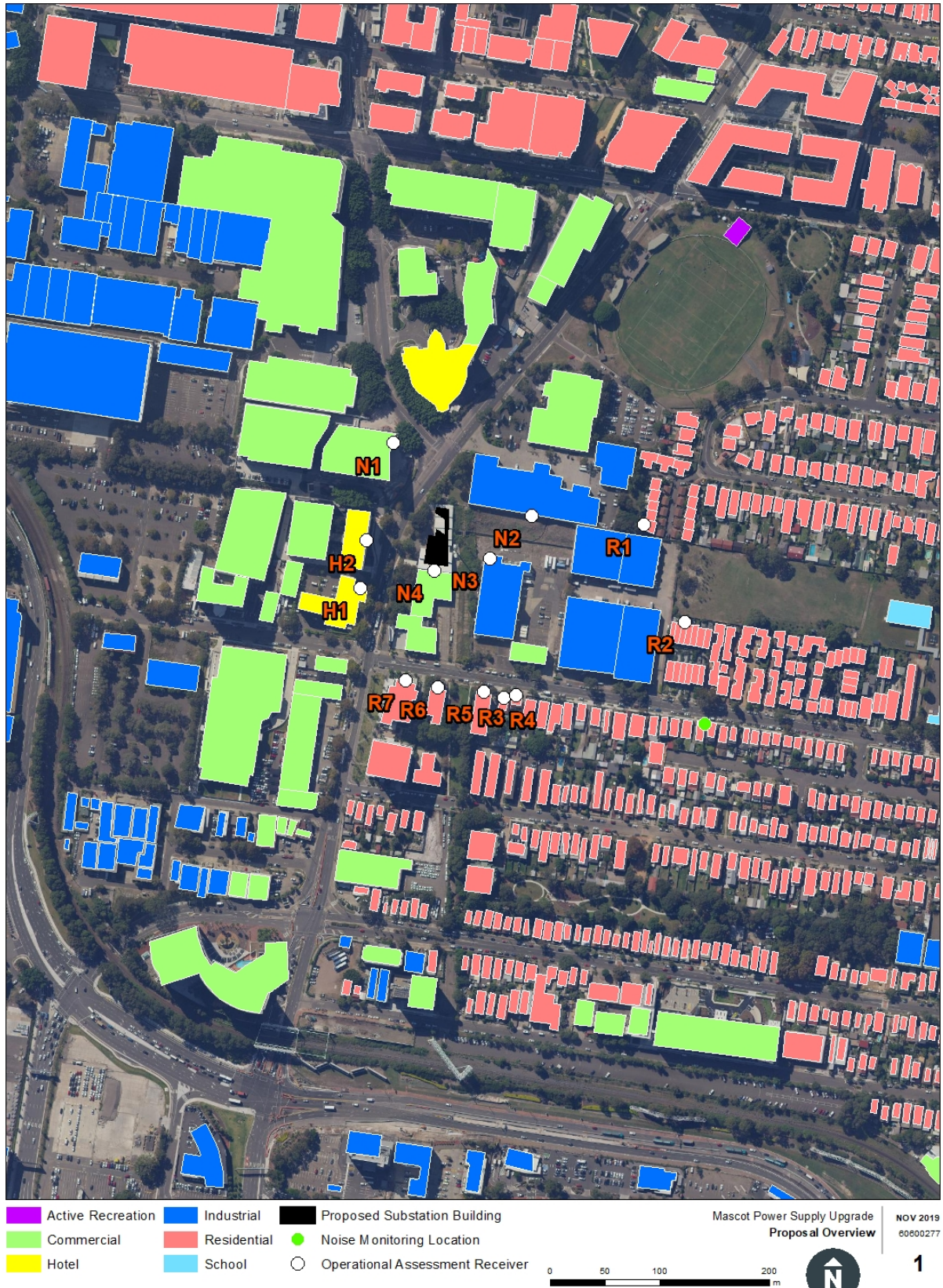


Figure 6.2 Noise sensitive receivers

Unattended noise monitoring

The unattended noise measurements define the long-term noise environment throughout the Proposal Area and are used to define the construction and operational noise criteria. Unattended noise monitoring was carried out from 18 October 2019 to 25 October 2019 at one location considered to be representative of the noise sensitive receivers near the Proposal Area. The noise monitoring location is shown graphically in **Figure 6.2** and described in **Table 6.7**.

Table 6.7 Noise monitoring details

Address	Model	Serial number
282 King Street, Mascot	Rion NL-52	876010

A summary of the measured L_{A90} background noise levels and existing L_{Aeq} ambient noise levels is presented in **Table 6.8**.

Table 6.8 Existing background and ambient noise levels, dB(A)

Address	Rating background level, L_{A90} dB(A)			Ambient noise levels, L_{Aeq} dB(A)		
	Day	Evening	Night	Day	Evening	Night
282 King Street, Mascot	46	42	37	65	64	58

Note: In accordance with the *Noise Policy for Industry* (EPA, 2017), time of day is defined as follows:

Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.

Evening – the period from 6 pm to 10 pm.

Night – the remaining periods.

Attended noise monitoring

Attended noise measurements are carried out to determine what noise sources contribute to the local noise environment. Attended noise monitoring was conducted on 25 October 2019. The measurement was completed over a 15 minute period. Weather conditions were clear on the day of monitoring, with negligible wind. The monitoring results from the attended measurements are presented in **Table 6.9**.

Table 6.9 Attended noise monitoring details

Address	Date and Time	Description	L_{Amax} (15min) dB(A)	L_{A10} (15min) dB(A)	L_{Aeq} (15min) dB(A)	L_{A90} (15min) dB(A)
282 King Street, Mascot	25/10/2019 10:41	Noise environment dominated by road traffic on King Street and aircraft take off noise. Helicopter flyover 63 dB (A).	85	58	55	46

6.3.2 Noise criteria

The EPA's *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) is the principal guideline for the assessment and management of construction noise in NSW. A quantitative assessment, based on likely construction scenarios, has been carried out for these works.

The ICNG recommends standard hours of construction as:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sundays and public holidays: no works.

For residential receivers, the ICNG recommends that the noise management levels (NML) resulting from construction activities not exceed the applicable rating background level (RBL) + 10 dB(A) during standard construction hours. Where NMLs are predicted to be exceeded, the ICNG recommends feasible and reasonable measures to be implemented to minimise adverse impacts. Where construction noise levels are likely to reach 75 dB(A) or more at residences (during standard construction hours), residential receivers are to be considered as 'highly noise affected'. In these circumstances, the proponent may be required to consider restricting hours of very noisy works to provide respite periods.

Outside of standard working hours, the ICNG recommends that the NMLs for residential receivers not exceed the applicable RBL + 5 dB(A).

The ICNG recommends separate NMLs for non-residential sensitive receivers, which applies when the applicable receiver is in use.

The construction NMLs developed for the Proposal for residential and non-residential sensitive receivers are listed in **Table 6.10**, **Table 6.11** and **Table 6.12**.

Table 6.10 Construction NMLs – Residential receivers

Period	RBL, L _{A90} dB(A)	Standard hours noise management levels, L _{Aeq(15min)} , dB(A)	Out of hours noise management levels, L _{Aeq(15min)} , dB (A)
Day	46	56	51
Evening	42	-	47
Night	37	-	42

Table 6.11 Construction NMLs – Non-residential receivers

Land use	Noise management levels, L _{Aeq(15min)} (applies when properties are in use)
Classrooms at schools and other educational institutions	Internal noise level - 45 dB(A)
Hospital wards and operating theatres	Internal noise level - 45 dB(A)
Places of worship	Internal noise level - 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level - 65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and	External noise level - 60 dB(A)

Land use	Noise management levels, $L_{Aeq(15min)}$ (applies when properties are in use)
where benefits are compromised by external noise intrusion, for example, reading, meditation)	
Community centres	Depends on the intended use of the centre. Refer to the recommended “maximum” internal levels in AS2107 for specific uses.

Table 6.12 Construction NMLs – Commercial and industrial land uses

Land use	Noise management levels, $L_{Aeq(15min)}$ (applies when properties are in use)
Industrial premises	External noise level - 75 dB(A)
Offices, retail outlets	External noise level - 70 dB(A)

Sleep Disturbance Criteria

Sleep disturbance noise goals have also been established for residential receivers which are based on the *NSW Road Noise Policy* (RNP) (Department of Environment, Climate Change and Water, 2011). The RNP contains a review of research into sleep disturbance which represents NSW EPA advice on the subject of sleep disturbance due to noise events. It concludes that having considered the results of research to date that “*Maximum internal noise levels below 50-55 dB(A) are unlikely to cause awakening reactions*”. Therefore, given that an open window provides around 10 dB(A) in noise attenuation from outside to inside, external noise levels of 60-65 dB(A) are unlikely to result in awakening reactions.

Table 6.13 presents the sleep disturbance screening and sleep disturbance awakening reaction criteria.

Table 6.13 Construction noise sleep disturbance criteria

Night-time rating background level, dB(A)	Sleep disturbance screening $L_{A1(1min)}$ criteria, dB(A)	Sleep disturbance awakening reaction $L_{A1(1min)}$ criteria, dB(A)
37	52	65

Construction Traffic Noise Criteria

To assess noise impacts from construction traffic an initial screening test should be undertaken by evaluating whether existing road traffic noise levels would increase by more than 2 dB(A), in line with the RNP. Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion then noise mitigation should be considered for those receivers affected.

Construction Vibration Criteria

Vibration assessment criteria relate to human comfort (tactile vibration) and structural or building damage.

Structural damage to buildings

No Australian Standards exist for the assessment of building damage caused by vibration at present. The German standard (DIN 4150) provides recommended maximum levels of vibration that reduce the likelihood of building damage caused by vibration and are presented

in **Table 6.14**. DIN 4150 states that buildings exposed to higher levels of vibration than recommended limits would not necessarily result in damage.

Table 6.14 DIN 4150: Structural damage safe limits for building vibration

Group	Type of structure	At foundation - Less than 10 Hz	At foundation - 10 Hz to 50 Hz	At foundation - 50 Hz to 100 Hz ¹	Vibration at the horizontal plane of the highest floor for all frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20 mm/s	20 to 40 mm/s	40 to 50 mm/s	40 mm/s
2	Dwellings and buildings of similar design and/or use	5 mm/s	5 to 15 mm/s	15 to 20 mm/s	15 mm/s
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Group 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order/heritage listed)	3 mm/s	3 to 8 mm/s	8 to 10 mm/s	8 mm/s

Notes:

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

Human comfort

The assessment of intermittent vibration outlined in the NSW EPA guideline *Assessing Vibration: A Technical Guideline* is based on Vibration Dose Values (VDVs). The VDV accumulates the vibration energy received over the daytime and night-time periods.

Maximum and preferred VDVs for intermittent vibration arising from construction activities are listed in **Table 6.15**. The VDV criteria are based on the likelihood that a person would be annoyed by the level of vibration over the entire assessment period.

Table 6.15 Preferred and maximum vibration dose values for intermittent vibration (m/s^{1.75})

Location	Daytime ¹ Preferred	Daytime Max	Night time Preferred	Night time Max
Critical areas (examples include hospital operating theatres and precision laboratories where sensitive operations are occurring)	0.1	0.2	0.1	0.2
Residences	0.2	0.4	0.13	0.26
Offices, schools, educational institutions, commercial premises and places of worship	0.4	0.8	0.4	0.8
Workshops or factory environments	0.8	1.6	0.8	1.6

Notes:

1. Day is defined as 7:00 am to 10:00 pm. Night is defined as 10:00 pm to 7:00 am

Operational noise criteria

Intrusiveness noise levels

The *Noise Policy for Industry* (NPfI) provides guidance in relation to acceptable noise limits for industrial noise emissions, which includes, but is not limited to, noise emissions from mechanical plant (NSW EPA, 2017).

The assessment procedure in the NPfI has two components:

- controlling intrusive noise impacts in the short term for residences. Intrusive noise criteria comprise the applicable RBL+5 dB(A)
- maintaining noise level amenity for residences and other land uses.

The NPfI provides intrusiveness noise levels applicable to the operation of the Proposal which are summarised in **Table 6.16**.

Table 6.16 Intrusiveness noise levels

Period	RBL. L_{A90} , dB(A)	Intrusiveness noise level (RBL + 5), dB(A)
Day	46	51
Evening	42	47
Night	37	42

Notes: In accordance with the NPfI, time of day is defined as follows:

Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays.

Evening – the period from 6 pm to 10 pm.

Night – the remaining periods.

Protecting noise amenity

To limit continuing increases in noise levels, the maximum ambient noise level resulting from all industrial noise sources in an area should not normally exceed the acceptable levels specified in Table 2.2 of the NPfI.

It was observed during attended and unattended noise monitoring that:

- road traffic noise from O’Riordan Street and aircraft noise were the dominant source of noise
- the existing $L_{Aeq(period)}$ traffic noise level is 10 dB(A) or more above the amenity noise level for some receiver types
- it is unlikely that traffic noise would reduce over time.

Therefore, the high traffic noise provisions were applied in accordance with the NPfI, Section 2.4.1 for some receiver types. These were adopted in place of recommended amenity noise levels to derive the project amenity trigger levels as summarised in **Table 6.17**.

Table 6.17 Recommended L_{Aeq} noise levels from industrial noise sources

Type of receiver	Period	Recommended amenity noise level, $L_{Aeq(period)}$	Measured $L_{Aeq(period)}$ (traffic)	Project amenity noise level, $L_{Aeq(15min)}$
Residential Urban	Day	60	55	58
	Evening	50	49	52 ¹
	Night	45	43	46 ¹
	Day	65	60	63

Type of receiver	Period	Recommended amenity noise level, $L_{Aeq(period)}$	Measured $L_{Aeq(traffic)}$ (traffic)	Project amenity noise level, $L_{Aeq(15min)}$
Hotel, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	Evening	55	50	53
	Night	50	45	48
School classroom	Noisiest 1-hour period when in use	45 ²	45	48
School playground	When in use	55	55	58
Area specifically reserved for passive recreation (e.g. national park)	When in use	50	50	53
Place of worship	When in use	50 ²	50	53
Commercial premises	When in use	65	65	68

Notes:

1. The existing $L_{Aeq(traffic)}$ traffic noise level is 10 dB(A) or more above the applicable recommended amenity noise level. Therefore, the high traffic noise provisions were applied in accordance with the NPfl, Section 2.4.1.
2. External noise levels are based on a 10 dB(A) reduction from outside to inside through an open window.

Project noise trigger levels

The project noise trigger level is the lower of the intrusiveness and the amenity noise levels. Provided in **Table 6.18** are the established project noise trigger levels for the assessment locations within the Proposal Area. **Table 6.18** presents the project noise trigger levels for the day, evening and night-time periods.

Table 6.18 Operational noise criteria

Type of receiver	Assessment period	Intrusive noise levels, $L_{Aeq(15min)}$	Amenity noise levels, $L_{Aeq(15min)}$	Project noise trigger levels, $L_{Aeq(15min)}$
Residential suburban	Day	51	58	51
	Evening	47	52	47
	Night	42	46	42
Hotel, motels, caretakers' quarters, holiday accommodation, permanent resident caravan parks	Day	-	63	63
	Evening	-	53	53
	Night	-	48	48
School classroom	Noisiest 1-hour period when in use	-	48	48

Type of receiver	Assessment period	Intrusive noise levels, $L_{Aeq(15min)}$	Amenity noise levels, $L_{Aeq(15min)}$	Project noise trigger levels, $L_{Aeq(15min)}$
School playground	When in use	-	58	58
Area specifically reserved for passive recreation (e.g. national park)	When in use	-	53	53
Place of worship - internal	When in use	-	53	53
Commercial premises	When in use	-	68	68

Tonality

The NPfl requires a penalty for noise characteristics such as tonality, impulsiveness, intermittency, irregularity or low frequency content. Specifically, the penalty is “to be applied to the noise from the source predicted at the receiver”.

The NPfl provides additional guidance and criteria for assessing noise emission from sources defined as ‘tonal’ or ‘low-frequency’. Of significance to substation noise is that penalties of up to 5 dB(A) may be applied where the subject noise emission is tonal or has significant low frequency content at the receiver.

A tonal penalty is applied when the level of a one-third octave band exceeds the level of each adjacent band by:

- 5 dB(A) or more if the centre frequency of the band containing the tone is between 500 Hz and 10,000 Hz
- 8 dB(A) or more if the centre frequency of the band containing the tone is between 160 Hz and 400 Hz
- 15 dB(A) or more if the centre frequency of the band containing the tone is between 25 Hz and 125 Hz.

A low frequency noise penalty is applied when the difference between the C and A weighted noise levels is 15 dB or more and:

- where any of the one-third octave noise levels in **Table 6.19** are exceeded by up to and including 5 dB and cannot be mitigated, a 2 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period
- where any of the one-third octave noise levels in **Table 6.19** are exceeded by more than 5 dB and cannot be mitigated, a 5 dB(A) positive adjustment to measured/predicted A-weighted levels applies for the evening/night period and a 2 dB(A) positive adjustment applies for the daytime period.

Table 6.19 One-third octave low-frequency noise thresholds

Hz/dB (Z)	One-third octave $L_{Zeq(15 min)}$ threshold level													
Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	
dB(Z)	92	89	86	77	69	61	54	50	50	48	48	46	44	

The maximum adjustment is 10 dB(A) where the noise contains two or more modifying factors (excluding the duration correction).

Maximum noise level assessment

The NPfl requires the potential for sleep disturbance to be assessed by considering maximum noise level events during the night-time period.

Where the subject development/premises night-time noise levels at a residential location exceed the following screening levels a detailed maximum noise level event assessment should be undertaken:

- $L_{Aeq(15min)}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{AFmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater.

The detailed assessment should cover the maximum noise level, the extent to which the maximum noise level exceeds the rating background noise level, and the number of times this happens during the night-time period.

Based on the measured background noise levels during the night, the sleep disturbance criteria for the nearest noise sensitive residential receivers are presented in **Table 6.20**.

Table 6.20 Night-time sleep disturbance screening levels

Type of receiver	Measured night-time RBL, $L_{A90(15min)}$, dB(A)	Sleep disturbance screening levels	
		$L_{Aeq(15min)}$	L_{AFmax}
Residential	37	42	52

6.3.3 Potential impacts

Construction

Predicted construction noise levels

In order to assess noise impacts from the site during construction, a noise model was created to represent a conservative worst case scenario. Construction noise was modelled in SoundPLAN Version 8.0, with the model being based on ground topography, ground absorption and reflection, buildings (residential and commercial), receivers (**Figure 6.2**) and from the use of plant and equipment listed in **Section 3.1.6**.

There would be no residential receivers affected where construction noise levels are predicted to exceed NMLs during the loudest construction stages for standard hours construction activities. A summary of the number of residential receivers to potentially be affected during out-of-hours construction activities are presented in **Table 6.21**. Out-of-hours work has been conservatively assessed against the more stringent night-time criteria.

It is important to consider that this assessment is representative of the worst case 15 minute period of construction activity, while the construction equipment is at the nearest location to each sensitive receiver location. The assessed scenario does not represent the ongoing day to day noise impact at noise sensitive receivers for an extended period of time.

Particularly noisy activities are likely to persist for only a portion of the overall construction period. In addition, the predictions use the shortest separation distance to each sensitive receiver, however in reality the distance would vary between plant and sensitive receivers.

Table 6.21 Predicted construction noise impacts for residential receivers outside standard construction hours

Construction scenario	NML	Number of receivers where noise levels may exceed the NML			
		NML exceedance <5 dB(A)	NML exceedance 5-14 dB(A)	NML exceedance 15-25 dB(A)	NML exceedance >25 dB(A)
Site establishment	42	7	1	0	0
New substation construction	42	31	8	0	0

During standard daytime construction hours, there are no receivers where noise levels are anticipated to exceed the NMLs by more than 10 dB(A), and no receivers are expected to be considered highly noise affected (>75 dB(A)).

The results presented in **Table 6.21** show that during the night-time, noise levels at a number of receivers are predicted to exceed the NMLs. Noise levels at up to 39 receivers are predicted to exceed the NMLs in the worst-case scenario – new substation construction. This is due to the high noise levels associated with this activity, proximity to noise sensitive receivers, in addition to the lower NMLs applicable during the night-time.

Sleep disturbance assessment

A sleep disturbance assessment has been undertaken for the proposed night works. The noise modelling results are provided in **Table 6.22**, with predicted noise levels compared with the sleep awakening reaction criterion.

A number of exceedances of the sleep disturbance screening criteria have been predicted due to the potential night-time construction works associated with the Proposal. However, noise associated with construction works are not anticipated to exceed the awakening reaction criteria.

Table 6.22 Predicted sleep disturbance impacts at residential receivers

Construction scenario	Sleep disturbance criteria, dB(A)	Maximum LA1(1min) noise level, dB(A)	Number of receivers where noise levels exceed	
			Sleep disturbance criteria	Awakening reaction criteria
Site establishment	52	63	8	0
New substation construction	52	64	25	0

Construction traffic assessment

For the construction traffic noise assessment indicative construction vehicle movements have been used in the absence of detailed vehicle movements.

Traffic counts for the existing AM peak (8am – 9am) and PM peak (5pm – 6pm) traffic flows have been sourced from a survey in a previous assessment completed for the Airport North Precinct titled ‘WestConnex enabling works (North) O’Riordan Street/Robey Street REF’ dated August 2015. These values have been converted to daytime (15 hour) and night-time (9 hour) traffic volumes. This conversion assumed the peak hour traffic flow is 11 per cent of the daily 24 hour traffic volume, and 88 per cent of the daily 24 hour traffic volume occurs during the 15 hour day (7am to 10pm) period whilst the remaining 12 per cent of vehicles travel during the 9 hour night-time (10pm to 7am) period. These volumes are presented in **Table 6.23**. The traffic

study also provided future traffic increases, however the existing survey has been used as it represents a conservative assessment.

It has also been assumed that current traffic consists of 7 percent heavy vehicles during the daytime and night-time.

The following construction traffic movements were conservatively used:

- 70 light vehicle movements during the daytime and night-time periods
- 30 heavy vehicle movements during the daytime and night-time periods.

Table 6.23 Existing traffic flows and additional traffic flows due to construction traffic

Road	Period	Existing traffic flow		Additional traffic flow		Relative noise increase, dB(A)
		Light	Heavy	Light	Heavy	
O’Riordan Street, Mascot	Daytime	23,205	1,747	70	30	0.0
	Night-time	3,164	238	70	30	0.3

The results indicate that the predicted noise increases are substantially lower than the 2 dB(A) screening criteria presented in the RNP. As a result, no further consideration of construction traffic is required at this stage.

Vibration

Vibration intensive work has the potential to occur as part of the construction work. Work may include the use of jackhammers and a bored piling rig.

Typical minimum working distances for the construction equipment that may be part of this proposal are provided in **Table 6.24**. Minimum working distances have been developed to meet the recommended levels of vibration in British Standard 6472-1992 and DIN 4150 and are based upon the safe working distances presented in TfNSW’s *Construction Noise and Vibration Strategy* (CNVS) (TfNSW, 2019h) and AECOM’s library of vibration data.

Minimum working distances should be adhered to when operating vibration intensive equipment near buildings in order to minimise the risk of discomfort to occupants and structural damage.

Table 6.24 Recommended minimum working distances for vibration intensive equipment

Equipment	Rating/description	Safe working distance (metres)	
		Cosmetic damage	Human response
Piling rig – bored	≤ 800 mm	2 (nominal)	N/A
Jackhammer	Hand held	1 (nominal)	Avoid contact with structure

Note: More stringent conditions may apply to heritage or other sensitive structures

The minimum working distances presented in **Table 6.24** assume individual items of plant would be operating independently. Concurrent operation of vibration intensive equipment should be avoided, however if it is necessary to operate multiple items of equipment concurrently close to the safe working distance then vibration monitoring is recommended.

The minimum working distances for cosmetic damage are general considered to be conservative and working within them would not necessarily result in damage. However, factors such as work practices and intervening ground conditions can affect vibration levels, so vibration monitoring is recommended within these distances and should be carried out at the beginning of the work in order to refine the safe working distances for site specific conditions.

Operational phase

Operational noise emissions associated with the operation of the new substation were assessed in accordance with the NPfI. Noise levels were predicted at nearby receiver locations based on typical operational noise sources from similar substation facilities. The typical scenarios were modelled to assess the potential for noise emissions to affect nearby sensitive receiver locations and achieve the required project noise trigger levels presented in **Table 6.18**. The predicted noise levels are presented below for 'reasonable' worst case night-time operations.

Noise modelling methodology

Both standard and noise-enhancing meteorological conditions were considered in accordance with the NPfI, with the following parameters:

Night-time

- standard meteorological conditions – Pasquill stability class D with wind speed up to 0.5 m/s at 10 metres
- noise-enhancing meteorological conditions – Pasquill stability class D with wind speed up to 3 m/s at 10 metres, and/or stability category F with winds up to 2 m/s at 10 metres.

The modelling includes:

- ground topography
- buildings and structures
- all identified noise producing items within the project site modelled as point or line sources where appropriate
- all sources are modelled to assume a 'reasonable' worst case 15-minute period scenario
- ground absorption.

It can be expected that there may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions, plant in operation during the measurement and also the location of the equipment and other noise sources.

All predicted noise levels are free field and at the most-affected point within a residential property boundary within 30 metres of the nearest facade.

Noise sources modelled

The operational equipment are generally categorised as steady-state or quasi steady-state noise sources which typically produce continuous and consistent noise levels. The operation of the substation equipment is expected to be consistent throughout the daytime, evening and at night.

To undertake the operational noise assessment in accordance with the NPfI, the future operations were considered for the night-time periods. This scenario has been assumed to represent 'reasonable' worst case operational conditions.

The major noise sources that have been considered for the operation of the new substation are detailed in **Table 6.25**.

Table 6.25 Substation equipment reference noise levels

Source	Sound power level (SWL), dB(A)
5.35 MVA Rectifier Transformer	68 L _{Aeq} ¹
DC Rectifier	<58 L _{Aeq} ²
Reactor	71 L _{Aeq} ²
9 MVA Transformer	71 L _{Aeq} ¹

Notes:

- 1 Sound Power Level (SWL) calculated in accordance with reduced maximum noise levels provided in AS60076.10.1:2009 considering the transformer capacity.
- 2 SWL based on equipment on similar substations projects.

The noise generating equipment and the equipment sound power levels should be confirmed at the detailed design stage.

Given that the L_{A1} sleep disturbance criterion is 10 dB less stringent than the project noise trigger level, compliance with the project noise trigger level would result in compliance with the sleep disturbance criteria. Therefore, no further consideration has been given to the sleep disturbance assessment.

Noise modelling results

A summary of the predicted operational noise impacts associated with the operations of the Proposal is presented for the night-time in **Table 6.26**.

Table 6.26 Summary of predicted noise levels for night time operations

Receiver location	Project noise trigger level, dB(A)	Predicted L _{Aeq} noise level, dB(A)	
		Standard meteorological conditions	Noise-enhancing meteorological conditions
R1 - 70 MacIntosh Street, Mascot	42	16	17
R2 - 243-245 King Street, Mascot	42	11	12
R3 - 310 King Street, Mascot	42	18	18
R4 - 312 King Street, Mascot	42	22	22
R5 - 314 King Street, Mascot	42	25	25
R6 - 318 King Street, Mascot	42	24	24
R7 - 330 King Street, Mascot	42	36	36
N1 - 189 O'Riordan Street, Mascot	63	47	47
N2 - 154 O'Riordan Street, Mascot	63	38	38
N3 - 263 King Street, Mascot	63	36	36

Receiver location	Project noise trigger level, dB(A)	Predicted L _{Aeq} noise level, dB(A)	
		Standard meteorological conditions	Noise-enhancing meteorological conditions
N4 - 176 O'Riordan Street, Mascot	63	52	52
H1 - 205-209 O'Riordan Street, Mascot	48	45	45
H2 - 191 O'Riordan Street, Mascot	48	46	48

As stated above, the maximum adjustment for annoying characteristics is 10 dB(A) where the noise contains two or more modifying factors (excluding the duration correction). Based on spectral noise levels for typical transformers, the proposed substation may be tonal and low frequency and therefore attracts a 5 dB adjustment.

The tonal characteristics of the proposed equipment should be reviewed at the detailed design stage based upon specific equipment selection.

Considering tonality adjustment, it can be seen in **Table 6.26** that the noise levels are not predicted to exceed the project noise trigger level at any of the selected representative receivers. It is likely that the noise emission from the Proposal would also comply at receivers at greater distances.

6.3.4 Mitigation measures

The following mitigation measures would apply to the Proposal:

- a Construction Noise and Vibration Management Plan (CNVMP) should be developed for the Proposal and implemented prior to commencement of construction activities. The CNVMP should include all feasible and reasonable safeguards to manage the noise emissions from the site and any complaints which may occur due to construction noise. The CNVMP should include, as a minimum, the following:
 - identification of nearby residences and other sensitive land uses
 - description of approved hours of work
 - description and identification of all construction activities, including work areas, equipment and duration
 - description of what work practices (generic and specific) would be applied to minimise noise and vibration
 - a complaints handling process
 - noise and vibration monitoring procedures, including for heritage structures
 - overview of community consultation required for identified high impact works
- construction works should be planned and carried out during standard construction hours wherever possible. The standard mitigation measures contained within the *Construction Noise and Vibration Strategy (CNVS)* (TfNSW, 2019h) would be considered as mitigation measures as part of the CNVMP
- all residents and sensitive receivers affected by noise levels from the Proposal which are expected to exceed the NML should be consulted prior to the commencement of the particular activity, with the highest consideration given to those that are predicted to

be most affected as a result of the works. The information provided to the receivers would include:

- programmed times and locations of construction work
- the hours of proposed works
- construction noise and vibration impact predictions
- construction noise and vibration mitigation measures being implemented on site.
- community consultation regarding construction noise and vibration would be detailed in a Community Liaison Management Plan for the construction of the Proposal and would include a 24-hour hotline and complaints management process
- the tonal characteristics of the proposed equipment should be reviewed at the detailed design stage based upon specific equipment selection.

6.4 Electric and magnetic fields

6.4.1 Methodology

An EMF assessment report was prepared (AECOM, 2019d) to assess the impact of the proposed Mascot Substation.

The EMF assessment is included as **Appendix E**.

Health Legislation and Guidelines

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) has adopted International Commission on Non-Ionizing Radiation Protection's (ICNIRP) 2010 *Guidelines for limiting exposure to time varying electric and magnetic fields (1Hz to 100 kHz)*, which it regards as international best practice, for application in Australia. The recommended ICNIRP (2010) magnetic field Reference Levels are provided in **Table 6.27**.

Table 6.27 50Hz Magnetic field reference levels¹

Publication	Reference Levels ²	
	General Public ³	Occupational ⁴
ICNIRP (2010)	200 μ T (2,000 mG)	1,000 μ T (10,000 mG)

Notes:

1. At 50Hz the most sensitive known impact is to the retinal tissue in the form of magneto-phosphenes.
2. The International System of Units (SI) for magnetic field strength is Tesla (T) and another commonly used unit is Gauss (G), where $1\mu\text{T} = 10\text{mG}$.
3. The general public is defined as individuals of all ages and of differing health statuses, which may include particularly vulnerable groups or individuals, and who may have no knowledge of or control over their exposure to EMF. Note that a foetus is defined as a member of the general public, regardless of exposure scenario, and is subject to the general public restrictions (ICNIRP 2010).
4. Occupationally-exposed individuals are defined as healthy adults who are exposed under controlled conditions associated with their occupational duties. They are trained to be aware of potential EMF risks and to employ appropriate harm-mitigation measures, and who have the capacity for such awareness and harm-mitigation response it is not sufficient for a person to merely be a worker (ICNIRP 2010).

EMF are found wherever electricity is present, including home and office appliances, substations and electrical cables. All electrical equipment creates electrical and magnetic fields. The electric field is associated with the voltage of the equipment and the magnetic field

is associated with the current. In combination, these fields cause energy to be transferred along electric wires. With both electric and magnetic fields, the strength of the field is strongest when close to its source and diminishes rapidly with distance from the source. ARPANSA provide a summary of typical magnetic field levels that may be encountered in daily life. The levels are shown in **Table 6.28**.

Table 6.28 Typical magnetic field levels encountered

Location	Source	Typical range	
		μT	mG
Home	Television	0.02 - 0.2	0.2 - 2
	Pedestal Fan	0.02 - 0.2	0.2 - 2
	Refrigerator	0.2 – 0.5	2 - 5
	Kettle	0.2 - 1	2 - 10
	Toaster	0.2 - 1	2 - 10
	Hairdryer	1 - 7	10 - 70
	Electric Stove	0.2 - 3	2 - 30
	Electric Blanket	0.5 - 3	5 - 30
Public Streets / Neighbourhood	Directly under LV/Medium Voltage (MV) Distribution Line	0.2 - 3	2 - 30
	10 m away from LV/MV Distribution Line	0.05 – 0.1	0.5 - 10
	Directly under HV Transmission Line	1 - 20	10 - 200
	At the edge of HV Transmission Line Easement	0.2 - 5	2 - 50
	Above underground cables (voltage not defined)	0.5 - 20	5 - 200

Note 1: The range of typical magnetic field levels associated with common household/office appliances are at normal user distances.

The possibility of adverse health effects due to the EMF associated with electrical equipment has been comprehensively studied over several decades worldwide. To date the scientific evidence does not establish that exposure to EMF found around the home, office or near power lines causes health effects.

Personal medical devices

For persons wearing Active Implanted Medical Devices (AIMDs), which include pacemakers and implantable defibrillators, the most relevant standard is considered to be European Standard *EN 50527-1 (2016) Procedure for the assessment of the exposure to electromagnetic fields of workers bearing active implanted medical devices*. Clause 4.1.2 of this standard states that:

“AIMDs are expected to function as described in their product standards as long as the General Public Reference levels of Council Recommendation 1999/519/EC (except for static magnetic fields) are not exceeded... and where no specific warnings have been issued to the AIMD-Employee.”

In regard to AIMD manufacturers, what this means in practice is that the devices need to be designed with an immunity up to the general public reference levels. Based on the date of the referred European Council recommendation, this means that older AIMDs are considered to be immune up to 100 μ T (1,000 mG).

For persons wearing a hearing aid or cochlear implant there is the standard risk of 50 Hz magnetic field noise occurring, which would not damage the devices or the ear. Where the device has a loop system receiver, operating the device in this mode would also function correctly as the magnetic field strength of the induction loop transmissions are to be designed with a high enough signal-to-noise ratio over background magnetic fields (as per EN 60118-4). Whilst modern AIMDs are expected to be designed with consideration of the current published Reference Levels, due to differences between manufacturers and countries of origin, we recommend any persons concerned consult with their physician.

6.4.2 Existing environment

The areas of particular interest are identified as places where public or staff could be exposed to the magnetic fields of the Proposal:

- inside the substation yard, i.e. offices in close proximity to the rectifier transformers and switchboards
- public boundary and adjacent buildings around the proposed Mascot Substation.

6.4.3 Potential impacts

Construction phase

During construction, the proposed Mascot Substation would not be energised (i.e. would not be operational) and would therefore not generate a magnetic field.

Operational phase

Mascot Substation

The area of interest for this part of the works where the public or staff could be exposed to the magnetic fields includes inside the substation yard, i.e. office/admin room in close proximity to the rectifier transformers and switchboards and the public boundary and adjacent buildings around the proposed Mascot Substation. The magnetic field contributions of the new Mascot Substation have been modelled to demonstrate the magnetic field contribution likely to be associated with the proposed substation. **Figure 6.3** shows a surface contour plot of the magnetic field contribution calculated within and around the substation.



FIGURE 6-3: PROPOSED MASCOT SUBSTATION - MAGNETIC FIELD RESULTS (AT ONE METRE ABOVE GROUND)



Legend

Total Magnetic Inductance (mG)	Color	Value
< 2000	Red	< 50
< 1000	Orange	< 10
< 500	Yellow	< 5
	Light Green	< 2

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From the results above, the following observations are made with regard to magnetic fields at Mascot:

- magnetic field levels near the 600V Alternative Current (AC) cables are approximately up to 2,000 mG which is below the occupational guideline reference level of 10,000 mG but it is potentially an issue for a person with an AIMD
- the highest magnetic field contribution is at the 11 kV switchboard with magnetic field levels approximately up to 2,000 mG. These levels are below the occupational guideline reference level of 10,000 mG but it is potentially an issue for a person with an AIMD
- magnetic field levels contributed from the proposed substation at the western public boundary are considered negligible (less than 2 mG). However, the existing 11 kV aerial power line along O’Riordan Street has magnetic levels contribution up to 10mG from a magnetic field measurement on 12 September 2019
- magnetic field levels at the southern boundary are approximately up to 50mG which is below the general public guideline reference level of 2,000 mG. The levels are reduced to negligible value (less than 2 mG) at 15 metres away.

6.4.4 Mitigation measures

The following mitigation measures would apply to the Proposal:

- the project would operate within the limits set in the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to EMF (ICNIRP, 2010)
- the design proposed using 3-core cables for 11 kV and three 1-core cables for 33 kV feeders. It is recommended to use all 3-core cables (or trefoil for any single core cables that cannot be avoided) to maximise the cancellation of magnetic fields
- openly share to public and staff the EMF predictions and comparison to the applicable standards and guidelines for the proposed facilities
- ensure staff awareness of the EMF health predictions and field sources within the substation, and comparison to the applicable standards and guidelines, and required safety protocols
- staff with AIMDS should consult with their physician if working in high EMF exposure (approaching and exceeding 1,000 mG) areas
- the main magnetic field contribution comes from the rectifier transformers which are located away from the public boundary
- it is recommended that the location of these transformers and 600 V AC cabling be reviewed to see if there is an opportunity to shift these in northerly direction, to determine whether there is a solution to reduce the magnitude of magnetic fields that extend beyond the southern boundary.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.5 Indigenous heritage

6.5.1 Methodology

A due diligence assessment was undertaken for the Proposal in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010). A basic Aboriginal Heritage Information Management System (AHIMS)

search was undertaken for the Proposal on 9 October 2019 (AHIMS Reference #455270). The search parameters were latitude, longitude from: -33.9293, 151.1824 to latitude, longitude from -33.9217, 151.1946 with a buffer of 200 meters. No Aboriginal sites were recorded in or near the location. As such, no extensive AHIMS search for the above search was required to identify the exact location of Aboriginal sites in the immediate vicinity of the Proposal Area.

6.5.2 Existing environment

Certain landscape features, such as waterways, sand dune systems, ridge tops, ridge lines, headlands, cliff faces and rock caves/shelters, can indicate the likely presence of Aboriginal sites. None of these features are present immediately surrounding the area covered by the Proposal, which is located within a disturbed and developed area (i.e. area surrounded by predominantly industrial and commercial development). Therefore, the Proposal is not considered to be located within a high-risk landscape for Aboriginal heritage potential. The extensive landscape modification and high level of disturbance that has occurred due to development of the rail and road corridor across the Proposal Area suggests that the presence of culturally sensitive buried items is unlikely within the boundaries of the Proposal.

The basic AHIMS search is included as **Appendix F**.

6.5.3 Potential impacts

Construction phase

Construction of the Proposal would involve some excavation and other ground disturbance for the following activities:

- construction of the Mascot Substation.

As no known indigenous heritage items are located in the vicinity of the Proposal Area, and due to the extensive landscape modification and high level of disturbance of the Proposal Area, the potential for unknown items to be present is considered to be low.

The Proposal is unlikely to affect Indigenous heritage during construction. The management measures recommended in **Section 6.5.4** would be implemented for the Proposal.

Operational phase

The operation of the proposal would not result in any ongoing impacts upon Indigenous heritage.

6.5.4 Mitigation measures

The following mitigation measures would apply to the Proposal:

- all construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to the Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites
- if unforeseen Indigenous heritage objects are uncovered during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2019b) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in coordinating the next steps which are likely to involve consultation with an Aboriginal heritage consultant, Heritage NSW and the Local Aboriginal Land Council

- if human remains are found, work would cease, the site secured and the NSW Police and Heritage NSW notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.6 Non-Indigenous heritage

6.6.1 Methodology

A desktop search of historic registers including the World Heritage List, National Heritage List, Commonwealth Heritage List, the Register of National Estate (RNE) (non-statutory archive), NSW State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the Botany Bay LEP 2013 was undertaken for the Proposal Area and surrounds.

6.6.2 Existing environment

The desktop search identified no items listed on the World, Commonwealth or National Heritage Lists within proximity of the Proposal.

No State heritage listed items were within 500 metres of the Proposal Area. The closest State heritage item (Botany Water Reserves SHR01317) is located approximately 1.5 kilometres southeast from the Proposal Area.

Table 6.29 shows the heritage listed items located within 500 metres of the Proposal Area. The items are listed as they appear on Schedule 5 of the relevant LEPs. The listing for each item is also noted, along with the distance from the Proposal Area.

No State heritage listed items were within 500 metres of the Proposal Area. The closest State heritage item (Botany Water Reserves) is located approximately 1.5 kilometres south from the Proposal Area.

Table 6.29 Locally listed, S170 and SHR heritage items within 500 metres of the Proposal

Register	Item name	Address	Property description	Item number	Distance	In view?
Botany Bay LEP 2013	Mascot Park	Coward Street (corner of O'Riordan Street)	Lot 7073, DP 93716; Lot 1, DP 668903	182	200 metres	No
Botany Bay LEP 2013	Mascot Public School building group	207 King Street, Mascot	Lot 1, DP 813088	1139	200 metres	No
Botany Bay LEP 2013	Sydney (Kingsford Smith) Airport Group	Sydney Airport	Part Lot 8, DP 1050923	1170	360 metres	No
S170 Register	Mascot (O'Riordan Street) underbridge	-	Railway location, Botany Line intersecting O'Riordan Street	SHI 4801830	460 metres	No

Register	Item name	Address	Property description	Item number	Distance	In view?
S170 Register	Mascot (Robey Street) underbridge	-	Railway location, Botany Line intersecting Robey Street	SHI 4801848	460 metres	No

6.6.3 Potential impacts

Construction phase

Given the distance between the Proposal Area and the listed non-Indigenous heritage items, the potential for the Proposal to impact on these heritage items is considered negligible.

Operational phase

Given the distance between the Proposal Area and the nearest listed non-Indigenous heritage items, it is unlikely that the Proposal would adversely affect these items during operation.

6.6.4 Mitigation measures

The following mitigation measures would apply to the Proposal:

- a heritage induction would be provided to workers prior to construction, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction
- in the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's *Unexpected Heritage Finds Guideline* (TfNSW, 2019b) would be followed and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and Department of Premier and Cabinet (DPC) (Heritage). Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.

Refer to **Section 7.2** for a list of proposed mitigation measures. All mitigation measures are to be incorporated into the CEMP.

6.7 Socio-economic impacts

6.7.1 Existing environment

Land uses adjacent to the proposed Mascot Substation are generally comprised of businesses, road infrastructure, recreational spaces, high density mixed use and residential areas.

The land on the eastern boundary of the proposed Mascot Substation is zoned SP2 Infrastructure – Sewerage. The proposed Mascot Substation is zoned B5 Business Development.

The nearest sensitive receivers to the Proposal Area include:

- temporary residential stays such as the Pullman Hotel, Adina Apartment Hotel and Holiday Inn on Bourke Road
- residential receivers on King Street, Mascot and on 70 MacIntosh Street
- Mascot Public School - the only educational facility within the area, located 200 metres south-east of the substation on Botany Road (school boundary). However, the closest school building is located 400 metres away
- local businesses:
 - Biggles Bar
 - Cafes including Southside Espresso, Rotisserie & Deli and Social Eatery.

A review of Australian Bureau of Statistics (ABS) 2016 census data was undertaken for Mascot. The suburb of Mascot has a population of 14,772 people with a median age of 32. 41.3 per cent of people living in the suburb of Mascot were born in Australia and 65.5 per cent of people over the age of 15 are employed full time (ABS, 2016). Approximately 31,870 trips per average weekday were recorded in 2018 for Mascot Station, making it the 17th busiest station that year (TPA, 2018).

6.7.2 Potential impacts

Construction phase

No property acquisition would be required as a result of the Proposal.

Construction of the Proposal has the potential to temporarily affect pedestrians, residents, motorists, local businesses and other receivers as a result of:

- temporary impacts to local traffic movements
- increased truck movements delivering materials and equipment and transporting waste
- construction noise, vibration, dust and visual impacts.

Temporary road disruptions may occur at O’Riordan Street near the proposed substation entrance during activities such as the delivery and unloading of oversized materials.

In such situations, affected people would be notified in advance of the scheduled works. Property access would be maintained at all times wherever possible.

Residents and business owners and customers would be temporarily affected during construction as a result of impacts to local traffic and parking, construction noise and vibration and air quality. These impacts have been assessed in more detail in **Section 6.1**, **Section 6.2**, **Section 6.3** and **Section 6.11**. Consultation with these affected stakeholders would be undertaken prior to construction activities to determine appropriate measures to manage construction related impacts.

Notwithstanding the above impacts, there would be benefits of the Proposal during construction including increased trade for business located close to the construction sites or en-route to construction sites, selling goods and services to construction workers.

Operational phase

Overall, the operation of the Proposal would provide positive socio-economic benefits to the Mascot community and the wider Bayside LGA through improved services including upgraded rail capacity, reliability and connectivity.

The operation of the Proposal would not result in substantial visual amenity impacts given that the proposed substation would visually integrate into the surrounding businesses and industrial environment on O’Riordan Street. These impacts would not be significant and would be the subject of ongoing mitigation and management by TfNSW and Sydney Trains to reduce impacts.

6.7.3 Mitigation measures

A number of safeguards would be implemented to minimise potential impacts on the community with a particular focus on keeping the community informed. The following mitigation measures would apply to the Proposal:

- sustainability criteria would be established to encourage construction personnel to purchase goods and services locally helping to ensure the local community benefits from the construction of the Proposal
- feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable
- contact details for a 24-hour construction response line, Project Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase
- the community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Management Plan to be developed prior to construction
- measures to avoid, reduce or mitigate amenity impacts would be implemented, as outlined in other sections of this REF.

Refer to **Sections 6.1, 6.2 and 6.3** for discussion on potential traffic/access, visual and acoustic amenity impacts arising from the Proposal and their respective proposed management strategies.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.8 Biodiversity

6.8.1 Existing environment

Landscape context

The Proposal Area contains little vegetation, being a highly urbanised/industrial environment. Vegetation is typically limited to street trees and landscaping within the streetscape, e.g. mature *Ficus microcarpa* var. *hillii* lining the road corridor near the intersection of Bourke Road and O’Riordan Street. Within the proposed substation site there are patches of Urban Exotics/Natives.

The Proposal Area is subject to ongoing human activity including vehicle and pedestrian movements throughout the day and night. As such the potential habitat value for threatened or migratory fauna is likely to be low, however some threatened fauna adapted to an urban environment may still occasionally use this area.

Database searches

Database searches do not provide the exact species that are located within or around the Proposal Area. They provide an indication of the species that may, are likely, or known to occur in the area based on species’ sightings, favoured habitats and behaviours.

A search of the Atlas of NSW Wildlife (NSW BioNet) (6 November 2019) found records of 57 threatened species listed under the BC Act within a 10 kilometre x 10 kilometre area centred in the Proposal Area. None of these records were within the immediate vicinity of the Proposal Area. The nearest recorded threatened species was the Grey-headed Flying-fox (*Pteropus poliocephalus*), located approximately 50 metres west of the Proposal Area on Bourke Road.

A further search was undertaken using the EPBC Act Protected Matters Search Tool (9 October 2019) (refer to Appendix G). The search was undertaken for the Proposal Area and a one kilometre radius. The search identified the following:

- 30 listed threatened species
- 18 listed migratory species
- two listed threatened ecological communities
 - Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community
 - Coastal Upland Swamps in the Sydney Basin Bioregion
- 25 listed marine species
- 48 invasive species.

6.8.2 Potential impacts

Construction phase

Vegetation is proposed to be removed within the proposed Mascot Substation site. Patches of Urban Exotics/Natives bounding the proposed substation site to the northern, eastern and southwest of the site have been identified to be removed. The loss of this vegetation would not be significant in the context of the low biodiversity value of the surrounding urban area. All vegetation removed would be subject to the *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019c).

Without the implementation of appropriate mitigation measures, there is potential for the proliferation of weed species as a result of construction activities, including species listed as priority weeds under the *Biosecurity Act 2015*. Construction activities also have the potential to import new weed species into the Proposal Area.

During construction, noise, dust, light and contaminated pollution (uncontrolled stormwater runoff) impacts upon biodiversity are predicted to be minimal; however, there may be some indirect impacts to fauna species that may use the trees outside of the Proposal site as habitat.

A significant impact assessment under the NSW BC Act or Commonwealth EPBC Act has not been undertaken as the Proposal is unlikely to result in a significant impact to any threatened species including the Grey-headed Flying-fox. Given the minor extent of the Proposal and minimal vegetation requiring removal, the Proposal is not likely to disrupt the lifecycle or ongoing viability of the population within the wider Sydney area.

Operational phase

The operation of the Mascot Substation would be contained within the site and would not cause any direct disturbance of fauna or flora in the area. These activities would not be extensive and impacts upon biodiversity values would be negligible.

6.8.3 Mitigation measures

A number of safeguards would be implemented to minimise potential impacts on biodiversity including:

- construction of the Proposal must be undertaken in accordance with TfNSW's *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019c) and TfNSW's *Fauna Management Guideline* (TfNSW, 2019d)
- all workers would be provided with an environmental induction prior to commencing work onsite. This induction would include information on the protection measures to be implemented to protect vegetation, penalties for breaches and locations of areas of sensitivity
- disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed would be clearly demarcated onsite prior to construction, to avoid unnecessary vegetation removal. Trees to be retained would be protected through temporary protection measures discussed below
- in the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible
- should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, separate approval would be required and the Construction Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval in accordance with TfNSW's *Vegetation Management (Protection and Removal) Guideline* (TfNSW, 2019c)
- for new landscaping works, mulching and watering would be undertaken until plants are established
- weed control measures, consistent with TfNSW's *Weed Management and Disposal Guideline* (TfNSW, 2019e), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the *Biosecurity Act 2015*.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.9 Contamination, landform, geology and soils

6.9.1 Existing environment

Landform, geology and soils

Based on the regional soil map of the area (Soil conservation service of NSW, 1989, Sydney Soil Landscape Series 9130, scale 1: 100,000), the soil underlying the site is characterised by the Tuggerah group comprising of gently undulating to rolling coastal dune fields.

The subsurface stratum from Mascot Station to 166 O'Riordan Street includes a sequence of dune sands, alluvial sands and clays, residual soils, and Ashfield Shale, it should be noted that the alluvial deposits are locally absent at Mascot Station. A summary of the stratum along the Airport Line tunnel is included in **Table 6.30**.

Table 6.30 Soil stratum at the Proposal site

Stratum	Depth to top (metres)	Depth to top (metres)	Description
Fill	0	1-2.5	The fill is comprised of pavement material, ash, crushed sandstone and concrete waste
Dune sand	1-2-5	8-21	Typically, medium dense/dense sand With occasional thin lenses of loose silty and peaty sand and stiff clay of at least stiff consistency and an occasional layer of dense to very dense and probably cemented sand
Alluvial clay and sand	11-16	17-24	Clay, clayey sand and silty sand The clays were typically soft to stiff and the sands very loose and loose. These clays are locally absent in at Mascot Station
Residual clay	18-20	21-29	Very stiff to hard clay and shaly clay with some iron-cemented bands
Ashfield Shale	22-30	-	Extremely low to very low strength shale and laminite Grading to medium, high strength shale

Acid sulfate soils

Reference to the Botany Bay LEP 2013 *Acid Sulfate Soils Map* shows the Proposal is located within an area of known occurrence of acid sulfate soils (Class 2 and 4).

Contamination

The site for the proposed substation was previously occupied by industrial units, however has since been cleared and a layer of compacted gravel placed to produce a level site. It is understood that the fill beneath the gravel layer is contaminated with pockets of asbestos in places.

In 2019, an Asbestos Inspection Report (commissioned by Cardno Pty Ltd) outlined the following regarding the proposed substation site:

- during former sampling events asbestos fines / friable asbestos was detected within soil samples at seven locations within the site
- two attempts were made to provide clearance to the northern section of the site. During both attempts the soil samples collected for the clearance returned a positive result for friable asbestos
- non-friable asbestos containing material (ACM) was visually observed and sampled, within the fill material, throughout the entirety of the site
- the site was deemed not safe in terms of the asbestos hazard for construction without management and mitigation measures
- it was recommended that a Class A asbestos removalist would be required to conduct the asbestos removal works at the site.

A Remediation Action Plan (RAP) was provided by Cardno (2019) which concluded that that the affected areas of the site could be made suitable for the proposed construction activities following the appropriate remediation and/or removal of localised affected soils.

Remediation and management of the site occurred in early and mid-2019 that included removal of some soils and asbestos affected fill along with placing a geofabric marker layer over the affected fill surface and then placing suitable and clean imported soils over the site.

A search of the NSW EPA Contaminated Land Register on 29 October 2019 identified one site within close proximity to the Proposal Area which has been issued with a notice by OEHL under the CLM Act. Located at 336-348 King Street, approximately 180 metres south-west of the proposed Mascot Substation is Former Mascot Galvanising.

Investigations were undertaken in 2017 (commissioned by the former Roads and Maritime Services) to identify any contaminations for a road widening project of O'Riordan Street between Bourke Road and Joyce Drive, Mascot. Soil samples were taken from boreholes with one located adjacent to the Proposal site. Results indicated that concentrations of organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs) and per- and poly-fluoroalkyl substances (PFAS) were not detected in the soil above the laboratory limit of reporting (LOR). Based on the results of the investigation, subsurface material is considered unlikely to present a risk to maintenance workers during upgrade works (WSP, October 2017).

6.9.2 Potential impacts

Construction phase

The Proposal would require excavation work for the installation of foundations and footings for the proposed substation.

Erosion and sedimentation

Excavation and other earthworks such as trenching and stockpiling activities, if not adequately managed, could result in the following impacts:

- erosion of exposed soil and stockpiled materials
- dust generation from excavation and vehicle movements over exposed soil
- increase in sediment loads entering the stormwater system and/or local runoff, with potential for runoff to enter the Sydney Water culvert present on site.

Such impacts can lead to an adverse environmental impact on biodiversity, for example, through the introduction of sediment into waterways or onto DPIE land.

Unmitigated, this potential impact would be considered to be of high significance due to the extreme soil erosion hazard and the relatively flat topography of the Proposal site. Erosion risks are however likely to be able to be adequately managed through the implementation of standard measures as outlined in *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) (the Blue Book).

Contamination

Excavation also has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. The exposure of contaminants could also pose an environmental risk if they were to enter nearby waterways via stormwater infrastructure.

As there is potential for onsite contamination, chemical testing and visual characterisation would be undertaken during construction to confirm the composition and nature of the excavated material. Spoil would be characterised as outlined in the NSW EPA *Waste Classification Guideline* (EPA, 2014) and if classified as unsuitable for reuse, would be transferred to an appropriately licensed offsite waste disposal facility.

There is also potential for activities to result in the contamination of soil through accidental fuel or chemical spills from construction plant and equipment.

The risk of impacts from contamination (if any) on human health (workers) from the construction activities is considered to be moderate due to the potential presence of hazardous material in old structures to be demolished and/or removed (e.g. redundant tracks and sleepers). The risks of impacts from contamination (if any) on human health (public) and the receiving environments from the construction activities is considered to be low.

Operational phase

During operation of the project there is potential contamination of soil to occur via accidental fuel or chemical spills or leakages.

6.9.3 Mitigation measures

The following mitigation measure would apply to the Proposal:

- prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the *'Blue Book' Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of works and maintained throughout construction
- erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. These measures would be maintained and left in place until the works are complete and areas are stabilised
- vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area
- all fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's *Chemical Storage and Spill Response Guidelines* (TfNSW, 2015b)
- develop site-specific asbestos management plans and implement controls to prevent and reduce the risk of exposure
- an appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements
- all spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility
- all spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal
- any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* (TfNSW, 2019f) with details included in the CEMP and location marked on the ECM.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.10 Hydrology and water quality

6.10.1 Existing environment

The substation is proposed to be constructed at 166 O’Riordan Street, Mascot. Located below the site is a Sydney Water storm water culvert made of reinforced concrete that is likely connected between Alexandria Canal and the storm water culvert adjacent to the site.

Surface water

The Proposal site is located approximately 1 kilometre east of the Alexandria Canal. The canal flows through the suburbs of St Peters and Mascot, past Sydney Airport to the Cooks River at Tempe and eventually discharges into Botany Bay. An existing Sydney Water asset also runs through the substation site is about 1.5 metres wide by 0.7 metres deep.

The substation site is relatively flat with scattered trapped low points thus making the identification of the natural flow direction unclear.

Flooding

Flood risk was initially reviewed at a regional scale. The Botany Bay LEP does not include an overlay of the Flood Planning Areas in this area. The proposed substation site contains an upstream open channel which has been identified within the Mascot, Roseberry & Eastlakes Flood Study (2019) 1 per cent annual exceedance probability (AEP) as a H5 Hydraulic Hazard (unsafe for vehicles and people) and categorized as a Floodway. The study does not indicate that the site is flood prone in flood events less than the Probable Maximum Flood (PMF) however, the rear of the site is adjacent to the open channel floodway.

Groundwater

A search of the Australian Groundwater Explorer on 13 November 2018 identified 89 registered groundwater monitoring bores within a 500 metres radius of the site. Additionally, there is a concentration of 37 registered monitoring bores located within a commercial site approximately 75 metres to the west of the site intersection of O’Riordan and High Street, indicating extensive monitoring (Cardno, February 2019). The monitoring wells are located within the Botany Groundwater Management Zone 2, which places a ban on the use of groundwater for domestic purposes (NSW Office of Water, 2017).

During contamination investigations undertaken in 2017 (refer to **Section 6.9**), groundwater results were compared against the adopted PFAS criteria. Analytical groundwater results were all below the laboratory LOR or the adopted assessment guidelines for any potential PFAS contamination in the groundwater (WSP, October 2017).

6.10.2 Potential impacts

Construction phase

Without appropriate safeguards, pollutants (fuel, chemicals or wastewater from accidental spills and sediment from excavations and stockpiles) could potential reach nearby stormwater drains and flow into waterways. Activities which would disturb soil during construction work also have the potential to affect local water quality as a result of erosion and run off sedimentation.

Direct impacts to the underground stormwater network may occur from demolition and construction activities through damaged infrastructure and pollutants entering waterways. Impacts to the stormwater network could also result in increased stormwater runoff.

Heavy wet weather events may cause localised flooding which could increase the potential for soil erosion and sedimentation impacts. Works would need to ensure that the drains within the Proposal site are kept unobstructed during construction.

Operational phase

Since the site was previously developed and used for industrial commercial purposes, there is little change in the use of the land, hence the pre and post development flows are expected to be of a similar order. No major additional water uses would be required for the operation the Proposal. As such it is not expected to increase hydraulic loading on the existing stormwater infrastructure.

6.10.3 Mitigation measures

The following mitigation measure would apply to the Proposal:

- a hydrological assessment would be undertaken during the detailed design phase to determine final drainage arrangements and flooding risks
- potential risks to local water quality during construction would be adequately managed by implementing standard erosion and sediment controls and managing water discharges from construction sites in accordance with TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2019g) and *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004)
- all fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's *Chemical Storage and Spill Response Guidelines* (TfNSW, 2015c)
- water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW *Chemical Storage and Spill Response Guidelines* (TfNSW, 2015c) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in how to use the kits in the case of a spill
- in the event of a pollution incident, works would cease in the immediate vicinity and the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act
- the existing drainage systems would remain operational throughout the construction phase
- dewatering activities, if required, would be undertaken in accordance with the Blue Book and TfNSW's *Water Discharge and Reuse Guideline* (2019g)
- should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the Waste Classification Guidelines (EPA, 2014) and TfNSW's *Water Discharge and Reuse Guideline* (TfNSW, 2019g)
- work should not take place during or after heavy rain when doing so is likely to cause soil erosion or soil structural damage or result in indirect impacts to any neighbouring vegetation or riparian corridors
- if existing contaminated groundwater is identified, measures would be implemented to ensure that the backfill within the excavation does not create a more permeable pathway for migration of contamination
- further investigation would be undertaken to confirm the need for a license for groundwater management in consultation with the Office of Water.

Refer to **Section 7.2** for a full list of mitigation measures.

6.11 Air quality

6.11.1 Existing environment

Based on a review of the existing land uses surrounding the Proposal, the existing air quality is considered to be characteristic of a typical urban environment in Sydney. There are several sources that may be contributing to the air quality in the study area as discussed below.

DPIE monitor air quality across NSW. Ground-level ozone (a key component of photochemical smog which appears as white haze in summer) remains an issue for Sydney and concentrations generally continue to exceed national air quality standards on a number of days each year.

A search of the National Pollutant Inventory database was undertaken on 30 October 2019 for the 2017-2018 reporting period. The database search identified 24 air polluting substances from three sources in the suburb of Mascot. The closest source was identified at Kingsford Smith Airport, Mascot from Qantas Airways Limited approximately 900 metres south-west of the proposed substation. Other contributors to air quality surrounding the Proposal include emissions from Sydney Airport Corporation and Viva Energy. Both are located within the boundary of Sydney Airport.

A number of non-industrial sources in the study area have the potential to influence the local air quality to varying degrees. These include:

- vehicle exhaust from the surrounding road network
- domestic solid fuel burning
- railways (diesel freight).

Potentially affected receivers within the vicinity of the site Proposal include local residents, businesses and community facilities surrounding the site and teachers and students at Mascot Public School.

6.11.2 Potential impacts

Construction phase

Temporary air quality impacts that may occur during construction include minor increases in dust and vehicle emissions. These include pollutants such as carbon monoxide, sulphur dioxide, particulate matter, nitrous oxides, volatile organic compounds and other substances associated with the combustion of diesel fuel and petrol from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- excavation for the foundation of the proposed substation
- stockpiling activities
- loading and transfer of material from trucks
- other general construction activities.

These activities, and associated air quality impacts, would be localised to work areas. Appropriate measures would be established to manage dust emissions from demolition works.

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

Operational phase

Overall impacts to air quality during the operation of the Proposal would be negligible as the Proposal would not result in any changes in land use. Also, as the Proposal would improve the customer experience, the Proposal may contribute to a mode shift to public transport from private vehicles which would reduce emissions in the long-term.

6.11.3 Mitigation measures

The following mitigation measure would apply to the Proposal:

- air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's *Air Quality Management Guideline* (TfNSW, 2019a)
- methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks
- plant and machinery would be regularly checked and maintained in a proper and efficient condition. Plant and machinery would be switched off when not in use, and not left idling
- vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable
- to minimise the generation of dust from construction activities, the following measures would be implemented:
 - apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces)
 - cover stockpiles when not in use
 - appropriately cover loads on trucks transporting material to and from the construction site and securely fix tailgates of road transport trucks prior to loading and immediately after unloading
 - prevent mud and dirt being tracked onto sealed road surfaces.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.12 Waste

6.12.1 Potential impacts

During construction of the Proposal, the following waste materials would be generated:

- asphalt and concrete
- surplus building materials
- excavated spoil
- building material wastes (including metals, timbers, plastics, fencing, packaging, etc.)
- electrical wiring and conduit waste (from electrical connections)
- hazardous chemical wastes
- green waste (including weeds)
- general waste, including food scraps generated by construction workers.

Careful planning of construction activities would ensure that the volume of surplus materials is minimised. Waste management would be undertaken in accordance with the WARR Act and a

Waste Management Plan would be prepared that would identify all potential waste streams associated with the works and outline methods of disposal, reuse and recycling as well as other onsite waste management practices.

With the exception of the additional waste collection and bin storage area for the new staff amenities building, the Proposal would not result in any additional changes to operational waste management arrangements.

6.12.2 Mitigation measures

The following mitigation measure would apply to the Proposal:

- the CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum:
 - identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities
 - detail other onsite management practices such as keeping areas free of rubbish
 - specify controls and containment procedures for hazardous waste and asbestos waste
 - outline the reporting regime for collating construction waste data
- an appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements (same as in **Section 6.9.3**)
- all spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility (same as in **Section 6.9.3**)
- all spoil and waste must be classified in accordance with the *Waste Classification Guidelines Part 1: Classifying waste* (EPA, 2014) prior to disposal (same as in **Section 6.9.3**)
- any concrete washout would be established and maintained in accordance with TfNSW's *Concrete Washout Guideline* (TfNSW, 2019f) with details included in the CEMP and location marked on the Environmental Controls Map (ECM) (same as in **Section 6.9.3**)
- the Proponent shall ensure that any transport, handling and management of Hazardous Materials during operation does not result in a potentially hazardous storage environment or present a significant risk to human health, life or property, or the biophysical environment, consistent with *State Environmental Planning Policy No. 33 - Hazardous and Offensive Development* and associated guidelines.
- the project would aim to achieve an 'Excellent' rating through the ISCA rating scheme. The application of the ISCA Rating scheme would also result in waste management targets to be developed for the Proposal and would include reuse and recycling.

Refer to **Section 7.2** for a full list of proposed mitigation measures.

6.13 Climate change and sustainability

6.13.1 Greenhouse gas emissions

An increase in greenhouse gas emissions, primarily carbon dioxide, would be expected during construction of the Proposal due to exhaust emissions from construction machinery and vehicles transporting materials and personnel to and from site.

The detailed design process would undertake an AS 14064-2 (Greenhouse Gases - project level) compliant carbon footprinting exercise in accordance with TfNSW's *Greenhouse Gas Inventory Guide for Construction Projects* (TfNSW, 2013) and *Carbon Estimate and Reporting Tool Guidelines* (TfNSW, 2015a). The carbon footprint would be used to inform decision making in design and construction.

Due to the small scale of the Proposal and the short term temporary nature of the individual construction works, it is considered that greenhouse gas emissions resulting from construction would be minimal. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures detailed in **Section 7.2**.

It is anticipated that, once operational, the Proposal could result in a mode shift towards public transport and a relative decrease in use of private motor vehicles by commuters to travel to and from Mascot. This may reduce the amount of fuel consumed with a corresponding relative reduction in associated greenhouse gas emissions.

6.13.2 Climate change

The dynamic nature of our climate system indicates a need to focus attention on how to adapt to the changes in climate and understand the limitation of adaptation. The effects of climate on the Sydney region can be assessed in terms of weather changes, storm intensity, flooding and increased risk of fire.

Climate change could lead to an increase in the intensity of rainfall events, whereby the rainfall expected to occur in a 100-year average recurrence interval (ARI) flood event would occur more frequently. The Proposal is not located on flood prone land; therefore, it is not expected to be affected by potential rainfall events amplified by climate change.

Climate change could lead to an increase in frequency and severity in bushfires. The Proposal is situated on land mapped as bush fire prone (Vegetation buffer) and would be designed with appropriate fire protection measures.

6.13.3 Sustainability

The design of the Proposal has been developed in accordance with the project targets identified in the *Sustainability Report for More Trains, More Services Stage 2 Program* (Aurecon, 2018) and further developed in the More Trains More Services Civil Concept with Site Investigations Packages 1 & 2 Sustainability Strategy (April, 2019). TfNSW would aim to achieve an 'Excellent' rating through the ISCA rating scheme. The scheme requires a number of mandatory and discretionary initiatives to be applied. Refer to **Section 3.1.4** for more information regarding the application of the scheme.

Sustainability is a key priority for More Trains, More Services. TfNSW is committed to delivering sustainable transport for NSW. The Program would contribute to the achievement of a sustainable transport system through:

- (a) minimising impacts to the environment through design, construction and maintenance
- (b) reinforcing inherent sustainability benefits
- (c) driving sustainability through recognised rating tools

- (d) maximising energy efficiency, renewables and greenhouse gas reduction
- (e) advocating for sustainable communities.

The Construction Contractor would (in conjunction with TfNSW) play a role in endeavouring to achieve an ISCA rating of “Excellent” (in accordance with Version 1.2 of the ISCA Guidelines) for the delivery, operation and maintenance phases of the Program.

6.14 Cumulative impacts

In accordance with clause 228 of the EP&A Regulation, any cumulative environmental effects of the Proposal associated with other existing and likely future activities must be taken into account in determining the potential impacts of the proposal on the environment.

Cumulative impacts occur when two or more projects are carried out concurrently and in close proximity to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was undertaken in isolation. Multiple projects undertaken at a similar time/similar location may also lead to construction fatigue, particularly around noise, traffic and air quality impacts, if not appropriately managed.

6.14.1 Existing or potential projects

A search of DPIE’s Major Projects Register, Development and Planning Register, and Bayside Council Development Application Register was undertaken on 30 October 2019. These searches identified the following developments:

- Major Projects:
 - State Significant Infrastructure for the Sydney Gateway Road Project – a new direct high capacity road connection linking the Sydney motorway network at the St Peters interchange with Sydney Kingsford Smith Airport. The Secretary’s Environmental Assessment Requirements have been issued and the project is currently in the phase to prepare an Environmental Impact Statement (EIS). Located 450 metres west of the proposed Mascot Substation.
 - State Significant Development for a new Flight Training Centre and associated development in Mascot and is approximately 5.2 ha in area. The site is located at 297 King Street, Mascot which is approximately 180 metres west of the proposed Mascot Substation. The proponent has responded to submissions and the project is currently at the Assessment stage.
- Bayside Council (within 500 metres of the Proposal Area):
 - 256 Coward Street, Mascot - Complying Development (amended Complying Development Certificate) to update layout design relating to fit-out and use of shop 3 as food and beverage premises. Located 150 metres southwest of the Proposal Area and was approved 24/10/2019
 - 16-18 John Street and 23 Church Avenue, Mascot - Development Application (Integrated Development) for the retention of part of Church Street facade, demolition of all remaining structures, excavation for basement parking levels and construction of two x thirteen storey mixed use buildings comprising ground level commercial and 126 residential units and rooftop communal open space including solar panels. Located approximately 100 metres east of the Proposal Area and is currently under assessment
 - 6-8 John Street & 13B Church Avenue, Mascot – Development application for the demolition of existing structures and construction of a twelve storey building

comprising of four hundred and thirty-five bedroom student accommodation and associated landscaping. Located approximately 160 metres east of the Proposal Area and is currently under assessment

- 5-11 Ewan Street, Mascot - Development Application (Modification of approved mixed use development) including internal and external design changes, relocation of auditorium and reduction in car parking. Located 300 metres southwest of the Proposal Area and is currently under assessment.

6.14.2 Construction

Should the Proposal coincide with the above proposals the potential for cumulative impacts is considered to be limited. This is due to their separation from the Proposal, as well as the low likelihood that residual impacts from either would contribute to any environmental or amenity factors exceeding suitable thresholds.

Construction of the Proposal would be coordinated with any other NSW government agency, such as TfNSW or Sydney Trains, so as to minimise cumulative construction impacts such as traffic and noise.

6.14.3 Operation

As outlined above, the Proposal would result in negligible operational and transport impacts upon the performance of the surrounding road network. The increase in rail services facilitate by the Proposal would likely be a net benefit to the area with the significant increase in the amount of residential accommodation currently under construction and proposed. As such it is anticipated that the cumulative impacts would be minor positive/negligible, provided that consultation with relevant stakeholders and mitigation measures in **Chapter 7** are implemented.

6.14.4 Mitigation measures

The following mitigation measure would apply to the Proposal:

- during construction, the works would be coordinated with any other construction activities in the area. Consultation and liaison would occur with Bayside Council, Sydney Trains, TfNSW and any other relevant public authorities or developers identified so as to minimise cumulative construction impacts such as traffic and noise
- the potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed and implemented as appropriate.

7 Environmental management

This chapter of the REF identifies how the environmental impacts of the Proposal would be managed through environmental management plans and mitigation measures. **Section 7.2** lists the proposed mitigation measures for the Proposal to minimise the impacts of the Proposal identified in **Chapter 6**.

7.1 Environmental management plans

A CEMP for the construction phase of the Proposal would be prepared in accordance with the requirements of TfNSW's EMS. The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the Proposal would be managed and outline a framework of procedures and controls for managing environmental impacts during construction.

The CEMP would incorporate as a minimum all environmental mitigation measures identified below in **Section 7.2**, any conditions from licences or approvals required by legislation, and a process for demonstrating compliance with such mitigation measures and conditions.

7.2 Mitigation measures

Mitigation measures for the Proposal are listed below in **Table 7.1**. These proposed measures would minimise the potential adverse impacts of the Proposal identified in **Chapter 6**, should the Proposal proceed.

Table 7.1 Proposed mitigation measures

No.	Mitigation measure
	General
1.	A Construction Environmental Management Plan (CEMP) would be prepared by the Construction Contractor in accordance with the relevant requirements of <i>Guideline for Preparation of Environmental Management Plans</i> , Department of Infrastructure, Planning and Natural Resources, 2004) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
2.	A Proposal risk assessment including environmental aspects and impacts would be undertaken by the Construction Contractor prior to the commencement of construction and documented as part of the CEMP.
3.	An Environmental Controls Map (ECM) would be developed by the Construction Contractor in accordance with TfNSW's <i>Guide to Environmental Controls Map</i> (TfNSW, 2015c) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.
4.	Prior to the commencement of construction, all contractors would be inducted on the key Proposal environmental risks, procedures, mitigation measures and conditions of approval.
5.	Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.
6.	Service relocation would be undertaken in consultation with the relevant authority. Contractors would mark existing services on the ECM to avoid direct impacts during construction.

No.	Mitigation measure
7.	Any modifications to the Proposal, if approved, would be subject to further assessment and approval by TfNSW. This assessment would need to demonstrate that any environmental impacts resulting from the modifications have been minimised.
Traffic and site access	
8.	<p>A construction TMP would be prepared by the Construction Contractor in consultation with TfNSW and provided to Bayside Council and TfNSW (formerly RMS). The construction TMP would be the primary tool to manage potential traffic and pedestrian impacts associated with construction. At a minimum, the construction TMP would include:</p> <ul style="list-style-type: none"> • ensuring adequate signage at construction work sites • consideration of safety and accessibility for pedestrians and cyclists • ensuring adequate sight lines to allow for safe entry and exit from the site • managing impacts and changes to on and off street parking, and parking locations for construction workers • routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses • measures to manage traffic flows around the area affected by the Proposal, including as required regulatory and direction signposting, line marking and variable message signs and all other traffic control devices necessary for the implementation of the TMP.
9.	Access to local businesses and residential properties would be maintained at all times (unless affected property owners have been consulted and appropriate alternative arrangements made).
10.	Consultation with the relevant road authorities would be undertaken during preparation of the construction TMP. The performance of all project traffic arrangements would be monitored during construction.
11.	Communication would be provided to the community, local residents and businesses to inform them of changes to parking, pedestrian access and/or traffic conditions including vehicle movements and anticipated effects on the local road network relating to site works.
12.	Heavy vehicle movements required as part of construction of the Proposal near Mascot Public School would be restricted during peak times and school zone hours. It may also be necessary to undertake other construction activities, such as concrete pours, crane lifts and delivery of oversized materials, outside standard construction hours to minimise traffic disruption.
13.	Access for emergency vehicles would be maintained in accordance with relevant requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes.
Urban design, landscape and visual amenity	
14.	Establish tree protection zones (TPZs) around trees to be retained. Tree protection would be undertaken in keeping with AS 4970-2009 <i>Protection of Trees on Development Sites</i> and would include exclusion fencing of TPZs.
15.	Provide well-presented and maintained construction hoarding and site fencing with shade cloth (or similar material) (where necessary) to minimise visual impacts on key view points during construction. Hoardings and site fencing would be removed following construction completion.

No.	Mitigation measure
16.	Provide cut-off or directed lighting to be used with and outside of the construction site, with lighting location and direction considered to ensure glare and light spill is minimised.
17.	Construction personnel to keep the construction areas clean and tidy including refuse placed in appropriate receptacles.
18.	Measures taken to ensure no tracking of dirt and mud into public roads and other public spaces.
19.	<p>To minimise visual impacts to the Proposal during operational activities, the following measures would be implemented:</p> <ul style="list-style-type: none"> • ongoing maintenance and repair of constructed elements • ongoing maintenance of vegetation, both surrounding and within the Proposal • removal of graffiti in accordance with Sydney Trains maintenance requirements.
Noise and vibration	
20.	<p>A Construction Noise and Vibration Management Plan (CNVMP) should be developed for the Proposal and implemented prior to commencement of construction activities. The CNVMP should include all feasible and reasonable safeguards to manage the noise emissions from the site and any complaints which may occur due to construction noise. The CNVMP should include, as a minimum, the following:</p> <ul style="list-style-type: none"> • identification of nearby residences and other sensitive land uses • description of approved hours of work • description and identification of all construction activities, including work areas, equipment and duration • description of what work practices (generic and specific) would be applied to minimise noise and vibration • a complaints handling process • noise and vibration monitoring procedures, including for heritage structures • overview of community consultation required for identified high impact works.
21.	Construction works should be planned and carried out during standard construction hours wherever possible. The standard mitigation measures contained within the <i>Construction Noise and Vibration Strategy (CNVS)</i> (TfNSW, 2019h) would be considered as mitigation measures as part of the CNVMP.
22.	<p>All residents and sensitive receivers affected by noise levels from the Proposal which are expected to exceed the NML should be consulted prior to the commencement of the particular activity, with the highest consideration given to those that are predicted to be most affected as a result of the works.</p> <p>The information provided to the receivers would include:</p> <ul style="list-style-type: none"> • programmed times and locations of construction work • the hours of proposed works • construction noise and vibration impact predictions • construction noise and vibration mitigation measures being implemented on site.
23.	Community consultation regarding construction noise and vibration would be detailed in a Community Liaison Management Plan for the construction of the Proposal and would include a 24 hour hotline and complaints management process.

No.	Mitigation measure
24.	The tonal characteristics of the proposed equipment should be reviewed at the detailed design stage based upon specific equipment selection.
Electric and magnetic fields (EMF)	
25.	The project would operate within the limits set in the International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines for limiting exposure to EMF (ICNIRP, 2010).
26.	The design proposed using 3-core cables for 11 kV and three 1-core cables for 33 kV feeders. It is recommended to use all 3-core cables (or trefoil for any single core cables that cannot be avoided) to maximise the cancellation of magnetic fields.
27.	Openly share to public and staff the EMF predictions and comparison to the applicable standards and guidelines for the proposed facilities.
28.	Ensure staff awareness of the EMF health predictions and field sources within the substation, and comparison to the applicable standards and guidelines and required safety protocols.
29.	Staff with AIMDS should consult with their physician if working in high EMF exposure (approaching and exceeding 1,000 mG) areas.
30.	The main magnetic field contribution comes from the rectifier transformers which are located away from the public boundary.
31.	It is recommended that the location of these transformers and 600 V AC cabling be reviewed to see if there is an opportunity to shift these in northerly direction, to determine whether there is a solution to reduce the magnitude of magnetic fields that extend beyond the southern boundary.
Indigenous heritage	
32.	All construction staff would undergo an induction in the recognition of Indigenous cultural heritage material. This training would include information such as the importance of Indigenous cultural heritage material and places to the Indigenous community, as well as the legal implications of removal, disturbance and damage to any Indigenous cultural heritage material and sites.
33.	If unforeseen Indigenous objects are uncovered during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2019b) would be followed, and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Proposal Manager and TfNSW Environment and Planning Manager so they can assist in coordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, Heritage NSW and the Local Aboriginal Land Council.
34.	If human remains are found, work would cease, the site secured and the NSW Police and Heritage NSW notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.

No.	Mitigation measure
Non-Indigenous heritage	
35.	A heritage induction would be provided to workers prior to construction, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction.
36.	In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW's <i>Unexpected Heritage Finds Guideline</i> (TfNSW, 2019b) would be followed and works within the vicinity of the find would cease immediately. The Construction Contractor would immediately notify the TfNSW Project Manager and the TfNSW Environment and Planning Manager so they can assist in co-ordinating the next steps which are likely to involve consultation with an archaeologist and Department of Premier and Cabinet (DPC) (Heritage). Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.
Socio-economic	
37.	Sustainability criteria would be established to encourage construction personnel to purchase goods and services locally helping to ensure the local community benefits from the construction of the Proposal.
38.	Feedback through the submissions process would be encouraged and opportunities and channels for the community and stakeholders to have input into the project would be provided.
39.	Contact details for a 24-hour construction response line, Project Infoline and email address would be provided for ongoing stakeholder contact throughout the construction phase.
40.	The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Management Plan to be developed prior to construction.
41.	Measures to avoid, reduce or mitigate amenity impacts would be implemented, as outlined in other sections of this REF.
Biodiversity	
42.	Construction of the Proposal must be undertaken in accordance with TfNSW's <i>Vegetation Management (Protection and Removal) Guideline</i> (TfNSW, 2019c) and TfNSW's <i>Fauna Management Guideline</i> (TfNSW, 2019d).
43.	All workers would be provided with an environmental induction prior to commencing work onsite. This induction would include information on the protection measures to be implemented to protect vegetation, penalties for breaches and locations of areas of sensitivity.
44.	Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed would be clearly demarcated onsite prior to construction, to avoid unnecessary vegetation removal. Trees to be retained would be protected through temporary protection measures discussed below.
45.	In the event of any tree to be retained becoming damaged during construction, the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager to coordinate the response which may include contacting an arborist to inspect and provide advice on remedial action, where possible.

No.	Mitigation measure
46.	Should the detailed design or onsite works determine the need to remove or trim any additional trees, which have not been identified in the REF, separate approval would be required and the Construction Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval in accordance with TfNSW's <i>Vegetation Management (Protection and Removal) Guideline</i> (TfNSW, 2019c).
47.	For new landscaping works, mulching and watering would be undertaken until plants are established.
48.	Weed control measures, consistent with TfNSW's <i>Weed Management and Disposal Guideline</i> (TfNSW, 2019e), would be developed and implemented as part of the CEMP to manage the potential dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of weeds in accordance with the <i>Biosecurity Act 2015</i> .
Contamination, landform, geology and soils	
49.	Prior to commencement of works, a site-specific Erosion and Sediment Control Plan would be prepared in accordance with the 'Blue Book' <i>Managing Urban Stormwater: Soils and Construction Guidelines</i> (Landcom, 2004) and updated throughout construction so it remains relevant to the activities. The Erosion and Sediment Control Plan measures would be implemented prior to commencement of works and maintained throughout construction.
50.	Erosion and sediment control measures would be established prior to any clearing, grubbing and site establishment activities and would be maintained and regularly inspected (particularly following rainfall events) to ensure their ongoing functionality. Erosion and sediment control measures would be maintained and left in place until the works are complete and areas are stabilised.
51.	Vehicles and machinery would be properly maintained and routinely inspected to minimise the risk of fuel/oil leaks. Construction plant, vehicles and equipment would also be refuelled offsite, or in a designated refuelling area.
52.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2015b).
53.	Develop site-specific asbestos management plans and implement controls to prevent and reduce the risk of exposure.
54.	An appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with SafeWork NSW requirements.
55.	All spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
56.	All spoil and waste must be classified in accordance with the <i>Waste Classification Guidelines Part 1: Classifying waste</i> (EPA, 2014) prior to disposal.
57.	Any concrete washout would be established and maintained in accordance with TfNSW's <i>Concrete Washout Guideline</i> (TfNSW, 2019f) with details included in the CEMP and location marked on the Environmental Controls Map (ECM).

No.	Mitigation measure
	Hydrology and water quality
58.	A hydrological assessment would be undertaken during the detailed design phase to determine final drainage arrangements and flooding risks.
59.	Consultation would be undertaken with Bayside Council regarding any additional discharge in stormwater from the station or along the council owned roads into the Council's existing drainage system.
60.	Potential risks to local water quality during construction would be adequately managed by implementing standard erosion and sediment controls and managing water discharges from construction sites in accordance with TfNSW's <i>Water Discharge and Reuse Guideline</i> (TfNSW, 2019g) and <i>Managing Urban Stormwater: Soils and Construction</i> (Landcom, 2004).
61.	All fuels, chemicals and hazardous liquids would be stored away from drainage lines, within an impervious bunded area in accordance with Australian Standards, EPA Guidelines and TfNSW's <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2015b).
62.	Water quality and hazardous materials procedures (including spill management procedures, use of spill kits and procedures for refuelling and maintaining construction vehicles/equipment) would be implemented in accordance with relevant EPA guidelines and the TfNSW <i>Chemical Storage and Spill Response Guidelines</i> (TfNSW, 2015b) during the construction phase. All staff would be made aware of the location of the spill kits and be trained in how to use the kits in the case of a spill.
63.	In the event of a pollution incident, works would cease in the immediate vicinity and the Construction Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager. The EPA would be notified by TfNSW if required, in accordance with Part 5.7 of the POEO Act.
64.	The existing drainage systems would remain operational throughout the construction phase.
65.	Dewatering activities, if required, would be undertaken in accordance with the Blue Book and TfNSW's <i>Water Discharge and Reuse Guideline</i> (2019g).
66.	Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the <i>Waste Classification Guidelines</i> (EPA, 2014) and TfNSW's <i>Water Discharge and Reuse Guideline</i> (TfNSW, 2019g).
67.	Work should not take place during or after heavy rain when doing so is likely to cause soil erosion or soil structural damage or result in indirect impacts to any neighbouring vegetation or riparian corridors.
68.	If existing contaminated groundwater is identified, measures would be implemented to ensure that the backfill within the excavation does not create a more permeable pathway for migration of contamination.
69.	Further investigation would be undertaken to confirm the need for a license for groundwater management in consultation with the Office of Water.
	Air quality
70.	Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW's <i>Air Quality Management Guideline</i> (TfNSW, 2019a).

No.	Mitigation measure
71.	Methods for management of emissions would be incorporated into Proposal inductions, training and pre-start/toolbox talks.
72.	Plant and machinery would be regularly checked and maintained in a proper and efficient condition. Plant and machinery would be switched off when not in use, and not left idling.
73.	Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.
74.	<p>To minimise the generation of dust from construction activities, the following measures would be implemented:</p> <ul style="list-style-type: none"> • apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces) • cover stockpiles when not in use • appropriately cover loads on trucks transporting material to and from the construction site and securely fix tailgates of road transport trucks prior to loading and immediately after unloading • prevent mud and dirt being tracked onto sealed road surfaces.
Waste and contamination	
75.	<p>The CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum:</p> <ul style="list-style-type: none"> • identify all potential waste streams associated with the works and outline methods of disposal of waste that cannot be reused or recycled at appropriately licensed facilities • detail other onsite management practices such as keeping areas free of rubbish • specify controls and containment procedures for hazardous waste and asbestos waste • outline the reporting regime for collating construction waste data.
76.	An appropriate Unexpected Finds Protocol, considering asbestos containing materials and other potential contaminants, would be included in the CEMP. Procedures for handling asbestos containing materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal to be undertaken in accordance with WorkCover requirements.
77.	All spoil to be removed from site would be tested to confirm the presence of any contamination. Any contaminated spoil would be disposed of at an appropriately licensed facility.
78.	All spoil and waste must be classified in accordance with the <i>Waste Classification Guidelines Part 1: Classifying waste</i> (EPA, 2014) prior to disposal.
79.	Any concrete washout would be established and maintained in accordance with TfNSW's <i>Concrete Washout Guideline</i> (TfNSW, 2019f) with details included in the CEMP and location marked on the Environmental Controls Map (ECM).
80.	The Proponent shall ensure that any transport, handling and management of Hazardous Materials during operation does not result in a potentially hazardous storage environment or present a significant risk to human health, life or property, or the biophysical environment, consistent with <i>State Environmental Planning Policy No. 33 - Hazardous and Offensive Development</i> and associated guidelines.

No.	Mitigation measure
81.	The project would aim to achieve an 'Excellent' rating through the ISCA rating scheme. The application of the ISCA Rating scheme would also result in waste management targets to be developed for the Proposal and would include reuse and recycling.
Climate change and sustainability	
82.	The project would aim to achieve an 'Excellent' rating through the ISCA rating scheme v1.2.
Cumulative impacts	
83.	During construction, the works would be coordinated with any other construction activities in the area. Consultation and liaison would occur with Bayside Council, Sydney Trains, TfNSW and any other relevant public authorities or developers identified so as to minimise cumulative construction impacts such as traffic and noise.
84.	The potential cumulative impacts associated with the Proposal would be further considered as the design develops and as further information regarding the location and timing of potential developments is released. Environmental management measures would be developed in the CEMP and implemented as appropriate.

8 Conclusion

This REF has been prepared in accordance with the provisions of section 5.5 of the EP&A Act, taking into account, to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The Proposal would contribute to the delivery of service improvements on the T8 Airport Line, including capacity, reliability and connectivity improvements for customers. The Proposal would provide additional capacity for stabling of suburban trains on the T8 Airport Line to support an uplift in the number of services.

The following key potential impacts have been identified:

- temporary changes to vehicle and pedestrian movements within the Proposal Area during construction of the Proposal
- visual amenity impacts during construction and operation
- noise and vibration impacts during construction and operation
- electric and magnetic fields during operation.

This REF has considered and assessed these impacts in accordance with clause 228 of the EP&A Regulation and the requirements of the EPBC Act (refer to **Chapter 6, Appendix A** and **Appendix B**). Based on the assessment contained in this REF, it is considered that the Proposal is not likely to result in a significant impact upon the environment or any threatened species, populations or communities. Accordingly, an EIS is not required, nor is the approval of the Minister for Planning.

The Proposal would also take into account the principles of ESD (refer to **Section 3.1.4** and **Section 4.6**). These would be considered during the detailed design, construction and operational phases of the Proposal. This would ensure the Proposal is delivered to maximum benefit to the community, is cost effective and minimises any adverse impacts on the environment.

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