Power Supply Upgrade Program
Surry Hills to Central Station Feeder Upgrade
Review of Environmental Factors
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<tr>
<td>AHIMS</td>
<td>Aboriginal Heritage Information Management System</td>
</tr>
<tr>
<td>ASS</td>
<td>Acid Sulfate Soils</td>
</tr>
<tr>
<td>BC Act</td>
<td><em>Biodiversity Conservation Act 2016 (NSW)</em></td>
</tr>
<tr>
<td>CBD</td>
<td>Central Business District</td>
</tr>
<tr>
<td>CEMP</td>
<td>Construction Environmental Management Plan</td>
</tr>
<tr>
<td>CLM Act</td>
<td><em>Contaminated Land Management Act 1997 (NSW)</em></td>
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<tr>
<td>CMP</td>
<td>Conservation Management Plan</td>
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<tr>
<td>CNVMP</td>
<td>Construction Noise and Vibration Management Plan</td>
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<td>CSR</td>
<td>Combined Services Route</td>
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<tr>
<td>DBH</td>
<td>Diameter Breast Height</td>
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<tr>
<td>DBYD</td>
<td>Dial Before You Dig</td>
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<tr>
<td>DoE</td>
<td>Commonwealth Department of the Environment</td>
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<td>ECM</td>
<td>Environmental Controls Map</td>
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<td>EMS</td>
<td>Environmental Management System</td>
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<tr>
<td>EPA</td>
<td>Environment Protection Authority</td>
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<td>EP&amp;A Act</td>
<td><em>Environmental Planning and Assessment Act 1979 (NSW)</em></td>
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<td>EP&amp;A Regulation</td>
<td><em>Environmental Planning and Assessment Regulation 2000 (NSW)</em></td>
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<td>EPBC Act</td>
<td><em>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</em></td>
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<tr>
<td>EPL</td>
<td>Environment Protection Licence</td>
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<td>ESD</td>
<td>Ecologically Sustainable Development (refer to Definitions)</td>
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<tr>
<td>FM Act</td>
<td><em>Fisheries Management Act 1994 (NSW)</em></td>
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<tr>
<td>GST</td>
<td>Galvanised Steel Troughing</td>
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<tr>
<td>Harbour REP</td>
<td><em>Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (NSW)</em></td>
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<td>Heritage Act</td>
<td><em>Heritage Act 1977 (NSW)</em></td>
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<tr>
<td>HCA</td>
<td>Heritage Conservation Area</td>
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<td>HRV</td>
<td>Heavy Rigid Vehicle</td>
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<td>Term</td>
<td>Meaning</td>
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<tr>
<td>ICNG</td>
<td><em>Interim Construction Noise Guideline</em> (Department of Environment and Climate Change, 2009)</td>
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<tr>
<td>Infrastructure SEPP</td>
<td><em>State Environmental Planning Policy (Infrastructure) 2007</em> (NSW)</td>
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<tr>
<td>kV</td>
<td>kilovolts</td>
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<tr>
<td>LEP</td>
<td>Local Environmental Plan</td>
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<td>LGA</td>
<td>Local Government Area</td>
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<td>MRV</td>
<td>Medium Rigid Vehicle</td>
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<td>NES</td>
<td>National Environmental Significance</td>
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<td>Noxious Weeds Act</td>
<td><em>Noxious Weeds Act 1993</em> (NSW)</td>
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<td>NDD</td>
<td>Non-Destructive Digging</td>
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<tr>
<td>NPW Act</td>
<td><em>National Parks and Wildlife Act 1974</em> (NSW)</td>
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<tr>
<td>NSW</td>
<td>New South Wales</td>
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<td>OEH</td>
<td>NSW Office of the Environment and Heritage</td>
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<td>OHW</td>
<td>Overhead Wiring</td>
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<td>OOHW</td>
<td>Out of hours works</td>
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<td>POEO Act</td>
<td><em>Protection of the Environment Operations Act 1997</em> (NSW)</td>
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<tr>
<td>PSU</td>
<td>Power Supply Upgrade</td>
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<tr>
<td>RailCorp</td>
<td>(former) Rail Corporation of NSW</td>
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<tr>
<td>RBL</td>
<td>Rating Background Level</td>
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<tr>
<td>REF</td>
<td>Review of Environmental Factors (this document)</td>
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<tr>
<td>Roads Act</td>
<td><em>Roads Act 1993</em> (NSW)</td>
</tr>
<tr>
<td>Roads and Maritime</td>
<td>NSW Roads and Maritime Services (formerly Roads and Traffic Authority)</td>
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<td>SEPP</td>
<td>State Environmental Planning Policy</td>
</tr>
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<td>SHR</td>
<td>State Heritage Register</td>
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<td>SoHI</td>
<td>Statement of Heritage Impact</td>
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<tr>
<td>TCP</td>
<td>Traffic Control Plan</td>
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<td>TfNSW</td>
<td>Transport for NSW</td>
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<tr>
<td>TMP</td>
<td>Traffic Management Plan</td>
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<td>Term</td>
<td>Meaning</td>
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<tr>
<td>TPZ</td>
<td>Tree Protection Zone</td>
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<tr>
<td>WARR Act</td>
<td><em>Waste Avoidance and Resource Recovery Act 2001 (NSW)</em></td>
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### Definitions

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<th>Term</th>
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<td><strong>Average Recurrence Interval</strong></td>
<td>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 will occur on average once every 100-years.</td>
</tr>
<tr>
<td><strong>Concept design</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Design and Construct Contract</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Detailed design</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>Ecologically Sustainable Development</strong></td>
<td>As defined by clause 7(4) Schedule 2 of the EP&amp;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.</td>
</tr>
<tr>
<td><strong>Feasible</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Galvanized Steel Troughing</strong></td>
<td>Galvanized Steel Troughing is a metal trough that is attached to walls or posts and contains electrical, signaling and communications cables.</td>
</tr>
<tr>
<td><strong>Interchange</strong></td>
<td>Transport interchange refers to the area/s where passengers transit between vehicles or between transport modes. It includes the pedestrian pathways and cycle facilities in and around an interchange.</td>
</tr>
<tr>
<td><strong>Noise sensitive receiver</strong></td>
<td>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).</td>
</tr>
<tr>
<td><strong>NSW Trains</strong></td>
<td>From 1 July 2013, NSW Trains became the new rail provider of services for regional rail customers.</td>
</tr>
<tr>
<td><strong>Out of hours works</strong></td>
<td>Defined as works <em>outside</em> standard construction hours (i.e. outside of 7am to 6pm Monday to Friday, 8am to 1pm Saturday and no work on Sundays/public holidays).</td>
</tr>
<tr>
<td><strong>Proponent</strong></td>
<td>A person or body proposing to carry out an activity under Division 5.1 of the EP&amp;A Act – in this instance, TfNSW.</td>
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<tr>
<td>Term</td>
<td>Meaning</td>
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<tr>
<td>Rail possession</td>
<td>Possession is the term used by railway workers to indicate that they have taken possession of the track (usually a section of track) for a specified period, so that no trains operate for a specified time. This is necessary to ensure the safety of workers and rail users.</td>
</tr>
<tr>
<td>Reasonable</td>
<td>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.</td>
</tr>
<tr>
<td>Sensitive receivers</td>
<td>Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals.</td>
</tr>
<tr>
<td>Sydney Trains</td>
<td>From 1 July 2013, Sydney Trains replaced CityRail as the provider of metropolitan train services for Sydney.</td>
</tr>
<tr>
<td>Sustainable Design Guidelines v4.0</td>
<td>TfNSW guidelines for sustainability approach to construction.</td>
</tr>
<tr>
<td>The Proposal</td>
<td>The construction and operation of the Power Supply Upgrade Program – Surry Hills to Central Station Upgrade (otherwise referred to as the 33kV Feeder 7U5).</td>
</tr>
<tr>
<td>Traction substation</td>
<td>A traction substation is an electrical substation that converts electric power from the form provided by the electricity provider to a voltage, current type, and frequency which can be used to supply the rail network with power to operate the rolling stock (trains).</td>
</tr>
<tr>
<td>Vegetation Offset Guide</td>
<td>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 5.5 of the EP&amp;A Act. 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.</td>
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Executive summary

Overview

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

Transport for NSW is upgrading electrical infrastructure as part of the Power Supply Upgrade (PSU) Program, which is designed to meet expected power requirements for Sydney’s future rail network and new fleet of air-conditioned trains, including New Intercity Fleet and Sydney Growth Trains projects.

A new power supply cable (33kv Feeder 7U5) is proposed to be constructed between the exiting Ausgrid substation at Surry Hills and the new Chalmers Street substation at Central Station to meet increased supply needs for the rail network (the Proposal).

The Feeder route is approximately 1.2 km in length, starting at Surry Hills Substation on Ann Street, travelling west along Albion Street, south along Elizabeth Street and into the rail corridor at the corner of Elizabeth Street and Foveaux Street. The Proposal would cross the suburbs of Surry Hills and Haymarket and occurs in the Local Government Area (LGA) of City of Sydney. Construction would include trenching, underboring and the installation of Galvanized Steel Troughing (GST) and a Combined Services Route (CSR).

The Proposal is part of the PSU Program which is a NSW Government initiative to provide new electrical infrastructure and upgrades to substations, section huts, overhead wiring and feeders across the network to provide additional power to operate trains, support the introduction of air-conditioned trains and improve service reliability by reducing the risk of disruption to rail services.

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 May 2019 and take around 12 to 18 months to complete. A detailed description of the Proposal is provided in Chapter 3 of this REF.

Need for the Proposal

Transport for NSW is rolling out world class technology to transform the rail network and provide customers with more reliable, high capacity services.

Upgrading the power supply cable will support the introduction of the new fleet of trains including the New Intercity Fleet and Sydney Growth Trains. Upgrading power supply also futureproofs the connection to the Sydney Trains network, allowing more trains and more services to be available to customers.

The existing power supply network will face increasing demand by future network requirements associated with the Sydney Metro integration and upgrades supporting the New Intercity Fleet (NIF) and Sydney Growth Train (SGT) fleet.

The Proposal involves the installation of a 33kV Feeder between Surry Hills Substation and Central Substation which would ensure the network meets expected power requirements under the PSU Program.

The specific objectives of the Proposal are to:

- provide power for the future Sydney Trains and Sydney Metro network
• provide power to support the introduction of the NIF and SGT trains
• install a new 33kV feeder would provide a reliable source of power for a growing network, enabling Sydney Trains and the future Sydney Metro to meet their power supply needs
• allow an existing Sydney Trains 33kV feeder (Feeder 755) to be decommissioned, which has on-going maintenance and reliability issues.

The new 33kV Feeder from Surry Hills Substation to Chalmers Street Substation is required to provide supply power to the Sydney Trains and Sydney Metro distribution network.

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 will be undertaken during the public display period of this REF. The community and customers will be invited to submit feedback to help TfNSW understand what is important and how we can improve the delivery of this project. The REF will be displayed for a period of two weeks. Further information about these specific activities is included in Section 4.5 of this REF.

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

TfNSW will 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 will be kept informed throughout the duration of the construction period. Figure 1.1 shows the planning approval and consultation process for the Proposal.

You can provide feedback by:

• Emailing: projects@transport.nsw.gov.au
• Writing to Surry Hills to Central Station Feeder Upgrade, Associate Director, Environmental Impact Assessment, Locked Bag 6501, St Leonards NSW 2065
• In person at our community information session, from 5pm to 7pm Wednesday 17 April 2019 at the Bradfield Room, Central Station (Grand Councourse, opposite Platform 1)
Environmental impact assessment

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

The following key impacts have been identified should the Proposal proceed:

- temporary impacts to the local pedestrian services and walking routes, cycle routes, public vehicle routes, public vehicle parking and building access during construction
- temporary cumulative construction noise impacts to sensitive receivers during construction
- potential impact to trees within the Chalmers Street entrance garden
• potential impact to street trees along the footpath of Elizabeth Street, Albion Street, Commonwealth Street and Ann Street
• if the Prince Alfred Substation building option is utilised as a site office there is the potential to disturb asbestos containing material and other hazardous substances (such as lead paint)

Further information regarding these 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), to ensure 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 detailed design of the Proposal would also be designed in accordance with the NSW Sustainable Design Guidelines – Version 4.0 (TfNSW, 2017c) taking into account the principles of ecologically sustainable development (ESD).

Should the Proposal proceed, any potential associated 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 ensure the Proposal is delivered to maximise benefit to the community and minimise any adverse impacts on the environment.

In considering the overall potential impacts and proposed mitigation measures outlined in this REF, the Proposal is unlikely to significantly affect the environment including critical habitat or threatened species, populations, ecological communities or their habitats.
1 Introduction

Transport for NSW (TfNSW) is 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 33kV Feeder 7U5 (the Proposal), to be delivered by the Infrastructure and Place Division.

1.1 Overview of the Proposal

1.1.1 The need for the Proposal

To ensure that sufficient power supply would be available for the introduction of the 2018 timetable, a power supply study was prepared by Sydney Trains power modelling considered the high voltage network requirements. This included an assessment of the full deployment of NIF and SGT train fleets, and considered the integration of the future Sydney Metro and completion of currently planned PSU works.

The power study made recommendations to assess and upgrade identified power feeder cables (which supply power to the rail power network from adjacent electricity distribution substations) across the Sydney Trains electrical network to ensure future power and traction demands are met.

One of the existing feeders connecting to Chalmers Street Substation identified for replacement was 33kV Feeder 755, which is subject to ongoing maintenance and reliability issues. The Chalmers Street Substation feeders are the main supply of the power for the Sydney Trains rail network in and around Central Station.

In order to meet increasing power demands of the network, it is proposed to construct a new 33kV feeder (known as Feeder 7U5) extending along a 1.2 km route from the Surry Hills Substation to the Chalmers Street Substation.

Overall, the installation of the new 33kV feeder would provide a reliable source of power for the network, enabling Sydney Trains and the future Sydney Metro to meet their power supply needs.

1.1.2 Key features of the Proposal

The proposed new 33kV Feeder 7U5 would be constructed between Chalmers Street Substation and Surry Hills Substations. The total route is approximately 1.2km in length, starting at Surry Hills Substation traveling west on Ann St, south on Commonwealth Street, west on Albion St, then across into Elizabeth/Foveaux St, passing Eddy Avenue and into the eastern side of the rail corridor of Central Station.

Key features of the Proposal are summarised as follows:

- geotechnical investigations within the Chalmers Street entrance garden and Elizabeth Street footpath
- potholing within the combined services route (CSR) route including the Prince Alfred siding gate, Chalmers Street entrance garden, Elizabeth Street footpath and road corridor
- trenching within the road reserve of Ann Street, Commonwealth Street, Albion Street and Elizabeth Street, including the Elizabeth Street footpath
- underboring to cross beneath the Sydney Light Rail alignment and Eddy Avenue
- drilling through the footings of the sandstone retaining wall at Chalmers Street entrance
- excavation and installation of cable access pits along the route
- installation of combined services along the route (ie signals, power and communications)
- installation of fixed and free-standing GST along rail corridor retaining wall
- laydown areas may include the Elizabeth Street footpath, Chalmers Street entrance garden, Prince Alfred Siding Carpark, Mortuary Station siding and Eveleigh Rail Yard which would involve:
  - storage of materials
  - temporary fencing and signage
  - lighting towers for night works
  - a site cabin (Elizabeth Street footpath, Mortuary Station siding)
  - ablution block (Elizabeth Street footpath and Prince Alfred Siding)

Subject to planning approval, construction is expected to commence in May 2019 and take 12 to 18 months to complete depending on possession availability.

Key features of the Proposal are shown in Figure 1.1. A detailed description of the Proposal is provided in Chapter 3 of this Review of Environmental Factors (REF).
Figure 1.1 Site locality and key features of the Proposal
1.2 Location of the Proposal

The Proposal is located on the southern border of Sydney’s Central Business District (CBD) in the suburbs of Surry Hills and Haymarket. The regional context of the Proposal is shown in Figure 1.2.

Surry Hills and Haymarket are located within the City of Sydney LGA. These suburbs are bounded by Redfern to the south, Chippendale to the southwest, Ultimo to the west, Pyrmont to the northwest, Sydney to the north and Paddington to the east. The area surrounding the proposal consists of metropolitan centre, general residential, recreational, mixed use and infrastructure zones.

The Proposal route is approximately 1.2 km in length, starting at Surry Hills Substation traveling through the road reserve west on Ann Street, south down Commonwealth Street, west on Albion Street, then across into Elizabeth Street heading south crossing Eddy Avenue. This portion of the Proposal route occurs within the road reserve which is land owned by City of Sydney Council.

The Proposal then extends to the Chalmers Street entrance garden, where it enters the rail corridor and travels south to the Chalmers Street Substation. This portion of the Proposal route occurs within the Central Railway Station boundary which is located on land owned by RailCorp, and operated and maintained by Sydney Trains. Central Railway Station is a state-significant heritage item listed on the State Heritage Register (SHR) under the NSW Heritage Act 1977 (Heritage Act). The heritage curtilage for the state heritage listing is shown in Figure 1.1.

Photographs of the Proposal site and surrounds are provided in Figure 1.3 to Figure 1.8.
Figure 1.2 Regional context
Figure 1.3 Prince Alfred Siding access gate and underboring site facing north-west (SLR)

Figure 1.4 Existing GST and other services within the rail corridor facing south (TfNSW)
Figure 1.5 Top view of Chalmers Street entrance and retaining wall inside the rail corridor facing east (TfNSW)

Figure 1.6 Chalmers Street entrance garden and sandstone retaining wall facing west (TfNSW)
1.3 Purpose of this Review of Environmental Factors

This REF has been prepared by TfNSW to assess the potential impacts of constructing a new 33kV feeder (Feeder 7U5). For the purposes of these works, TfNSW is the proponent and the determining authority under Division 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

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 mitigation measures to reduce the likely impacts of the Proposal. This REF has been prepared in accordance with clause 228 of the Environment Planning and Assessment Regulation 2000 (the EP&A Regulation).

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 (NES) or Commonwealth land, and the need to make a referral to the Commonwealth Department of Environment for any necessary approvals under the EPBC Act. 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 PSU Program and the specific objectives of the Proposal. This chapter also provides a summary of the options that have been considered during the development of the Proposal and why the preferred option has been chosen.

2.1  Strategic justification

2.1.1  Overview

Improving transport customer experience is the focus of the NSW Government’s transport initiatives. Transport interchanges and train stations are important gateways to the transport system and play a critical role in shaping the customer’s experience and perception of public transport.

Installation of the new 33kV feeder, Feeder 7U5, forms part of the PSU Program. TfNSW is working to develop and implement the PSU Program in NSW, involving a suite of traction supply infrastructure projects across the Sydney metropolitan rail network.

The Future Transport Strategy 2056 (Transport for NSW, 2018), provides a framework for transport challenges in NSW until 2056. The Proposal and overarching PSU Program aligns with the strategy by providing the electrical infrastructure required to meet the power demands of the growing transport network. Further details of the application of NSW Government policies and strategies are discussed in Section 4.5 of this REF.

2.1.2  Objectives of the Power Supply Upgrade Program

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

The objectives of the PSU Program are to:

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

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

2.1.3  Objectives of the Proposal

The specific objectives of the Proposal are to:

- provide power for the future Sydney Trains and Sydney Metro network
- provide power to support the introduction of the New Intercity Fleet trains
- enable an existing Sydney Trains 33kV feeder (Feeder 755) to be decommissioned, which has on-going maintenance and reliability issues.
2.2  Design development

TfNSW commissioned the development of a concept design for the new Feeder that would connect Surry Hills and Chalmers Street Substations. Several route options were explored with key considerations to traffic and interface with the neighbouring Sydney Light Rail and Sydney Metro projects.

The subject site occurs around Sydney’s largest railway station and busy CBD streets, this poses a number of challenges including essential short term road or lane closures for road trenching works and an extensive network of buried services including water, sewage, electrical and communications. Pedestrian and road traffic impacts were key considerations throughout design development and ongoing coordination with Sydney Council is being undertaken. An underboring technique in sensitive areas was adopted as part of the construction methodology to avoid such impacts. Underboring is a trenchless method to install pipes underground by drilling horizontally below the surface. The design has been developed to minimise community impacts.

All options contained varying levels of interface with Sydney Light Rail, Sydney Metro, and Sydney Trains. This posed a number of engineering and safety constraints given the number of utilities and services in the road, including existing high voltage Sydney Trains feeders (Feeder 755). In addition, the project was constrained with the number of possessions/closedowns available at Central Station, (particularly the Airport Line), to reduce customer impacts during the works. Consideration was also given to shorten the route length to avoid longer periods of road closures and additional construction costs.

2.3  Alternative options considered

Three concept design options between Surry Hills Substation and Chalmers Street Substation were developed to address power requirements and objectives, these are summarised as follows:

- **Option 1** proposed to follow the existing Feeder 755 route extending approximately 1.2 km through Ann Street, Riley Street, Foveaux Street, Devonshire Street, Elizabeth Street, Rutland Street, Chalmers Street and Prince Alfred Park. This option traverses a number of high-traffic roads with a section of the route interfacing with Sydney Light Rail along Devonshire Street. This option would require the entire route to consist of CSR.

- **Option 2** extends along a 1.2 km route on Ann Street, Commonwealth Street, Foveaux Street, Terry Street, Kippax Street, Holt Street and Devonshire Street. This option occurs on low-traffic roads with a section of the route interfacing with Sydney Light Rail on Devonshire Street. This option would also consist entirely of CSR.

- **The preferred option** (the Proposal) involves the installation of approximately 800 m of CSR along Ann Street, Commonwealth Street, Albion Street and Elizabeth Street. The route would enter the rail corridor and travel south along the rail corridor boundary to Chalmers Street Substation, this section would involve the installation of approximately 400m of GST and a small portion of CSR under a sliding access gate. This route offers the least interface with Sydney Light Rail on the corner of Eddy Avenue and Elizabeth Street.

2.4  The ‘do-nothing’ option

Under a ‘do-nothing’ option, the existing defective 755 Feeder would remain and operate in an unreliable state.
The ‘do nothing’ option was not considered a feasible alternative as it is inconsistent with NSW Government objectives and would not meet the growing power demands of the Sydney Trains and Sydney Metro network.

### 2.4.1 Assessment of identified options

The design options were assessed in a multi-criteria analysis that included consideration of factors such as engineering constraints, timing and cost to select a preferred option. These options were developed following several workshops within the stakeholder group which includes Sydney Trains, Sydney Coordination Office and City of Sydney Council (Officers).

Option 1 and 2 offer similar constraints, the key difference being traffic levels along the routes. Option 1 occurs on typically busier roads for which road closures and coordination with City of Sydney Council /Stakeholders would result in higher impacts to the local community and vehicle users.

Both Option 1 and 2 require excavation across Chalmers St and along Devonshire Street which is currently the site for Sydney Light Rail, this poses a number of engineering constraints and risks including works within 3 metres of existing live cable with limited availability of extended isolations. The risks associated with undertaking construction adjacent to Sydney Light Rail works involve potential project delays, thus Option 1 and 2 were not preferred by TfNSW and the City of Sydney Council.

Additionally, both Option 1 and 2 require the entire route to be in CSR. The installation of CSR involves greater risk with regards to existing live services, unknown services within the ground, greater interface with road closures as well as often being more costly and time intensive.

The Proposal route assessed in this REF is the preferred option after consideration of the constraints and impacts and discussion with Sydney City Coordination office and Light Rail project team.

### 2.5 Justification for the preferred option

The preferred option was selected as it would meet Sydney’s future rail network demands by:

- Providing a reliable power supply between the Ausgrid substation in Ann St, and the Sydney Trains substation off Chalmers St.
- reducing the risk of clashing with unknown underground services and shortening project timelines by bringing a reasonable portion of the route through the rail corridor
- reducing disruptions to the community by CSR works occurring mostly in low-traffic streets
- reducing road closures by having a portion of the route inside the rail corridor
- reducing engineering constraints by having the least interface with Sydney Light Rail
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

The Proposal involves the installation of a new Feeder which includes GST and CSR, the location of these are shown in Figure 1.1. The Proposal would include the following key elements:

- geotechnical investigations within the Chalmers Street entrance garden and Elizabeth Street footpath
- potholing within the CSR route including the Prince Alfred siding gate, Chalmers Street entrance garden, Elizabeth Street footpath and road corridor
- trenching within the road reserve of Ann Street, Commonwealth Street, Albion Street and Elizabeth Street
- underboring to cross Sydney Light Rail and Eddy Avenue
- drilling through the footing of the sandstone retaining wall at Chalmers Street entrance
- excavation and installation of cable pits along the route
- installation of combined services along the route
- installation of fixed and free-standing GST along rail corridor retaining wall parallel to the existing GST
- laydown areas may include the Elizabeth Street footpath, Chalmers Street entrance garden, Prince Alfred Siding Carpark, Mortuary Station siding and Eveleigh Rail Yard. These areas would be used for:
  - storage of materials
  - temporary fencing and signage
  - lighting towers for night works
  - a site cabin (Elizabeth Street footpath, Mortuary Station siding)
  - ablution block or toilets (Elizabeth Street footpath and Prince Alfred Siding)

3.1.1 Scope of works

The following scope of works are required to complete the installation of a new feeder to connect Surry Hills and Chalmers Street Substations.

**Geotechnical investigation**

Geotechnical investigations are required to assess the ground conditions for underboring works. Borehole drilling would occur on both sides of Eddy Avenue, at the Chalmers Street entrance garden and within the footpath on Elizabeth Street. Up to two bores may be required on each side. These bores would be up to 9 metres deep and 0.3 metres in diameter.

**Potholing works**

Potholing works would occur along the CSR route within roads, footpaths and the Chalmers Street entrance garden to identify known and unknown services. Potholes would be reinstated
following completion of works. Potholing works would occur during and outside standard working hours.

**Installation of cable pits**

A number of cable pits are required to pull the feeder along the CSR route. Cable pits would be installed underground, and would involve excavation and concreting works. A typical cable pit is 3 metres wide by 3 metres long and up to 2 metres deep (Figure 3.1). Cable pits are proposed at the following locations:

- south of the existing sandstone retaining wall (riser shaft pit) within the rail corridor
- north of the existing sandstone retaining wall (cable maintenance and pulling pit) within the entrance garden.
- on the footpath before the feeder route turns from the road corridor of Elizabeth Street
- within the road corridor at the halfway point of the feeder route on Albion street
- within the road corridor at the corner of Commonwealth Street and Albion Street
- within the road corridor at the corner of Commonwealth Street and Ann Street

The exact location of the proposed cable pits would be determined during detailed design.

The installation of the concrete riser shaft pit would be completed over several railway possession weekends. Remaining cable pits would be constructed during road and footpath trenching works.

**Installation of CSR**

The installation of CSR involves trenching within the road corridor of Ann Street, Commonwealth Street, Albion Street, Elizabeth Street roads and the Elizabeth Street footpath. A typical trench is 0.7 metres wide and 1.5 metres deep however up to 1.2 metres wide and 3.0 metres deep may be required depending on existing buried services (Figure 3.2). This section of works is expected to occur over a period of approximately five months.

Trenching works would also be completed at the Prince Alfred siding access gate for the installation of CSR. Completion of trenching works would include temporary and permanent restoration of existing road and footpath which as closely as possible matches that the surface in both texture and density. Prince Alfred siding gate works also involve the removal of a
redundant overhead wiring (OHW) concrete footing. A portion of the Prince Alfred siding works would occur during a rail possessions.

![Section A](image)

**Figure 3.2 Typical trench cross-section**

Underboring works are proposed from the Chalmers Street entrance garden north to the start of the Elizabeth Street footpath. Open trenching would then occur along the footpath to the cable pit. Two temporary bore pits are required to set-off and receive the underbore on each side of Eddy Avenue, these would be constructed within the Chalmers Street entrance garden and within the footpath of Elizabeth Street. The temporary bore pits would be constructed up to 6 metres wide, 5 metres long by 5 metres deep via mechanical excavation. These pits would be reinstated following completion of underboring works. The underbore itself will be up to 0.85 metres in diameter (Figure 3.3). Underboring is expected to occur over a one month period.
Works within the Chalmers Street entrance garden may require the trimming and/or removal of a number of trees depending on access requirements. This would be determined during detailed design. Trees lining the footpath along Ann Street, Commonwealth, Albion Street and Elizabeth Street may also be affected. An arboricultural assessment has been undertaken for the Proposal and is summarized in Section 6.7.

Trenching will be required from the caisson shaft pit to the start of GST for a transitional section of CSR/GST. This transitional section would involve fixing to the sandstone wall using either new or existing brackets and/or free-standing posts.

Cable drum trucks, a winch and rollers would be required to pull the feeder cable within the trenched route within the roads and footpath. Road closures may be required dependent upon pit locations along route. Cable pulling along the CSR route is expected to take approximately two weeks.

**Installation of GST**

The installation of GST within the rail corridor would occur along the eastern boundary over approximately four weekend track possessions. The GST would be attached using a combination of methods as shown in Figure 3.4, these are as follows:

- new free-standing GST posts
- amending existing GST brackets
- installation of brackets on existing structures.

Cable pulling from the cable pit in Chalmers Street entrance garden to Chalmers Street Substation is expected to occur during a rail possession period.
Boring through the sandstone retaining wall

To bring the feeder into the rail corridor, it is proposed to bore through the footing of the sandstone retaining wall at Chalmers Street entrance. There would be around six bores in total, four at approximately 0.2 metres diameter and two at approximately 0.1 metres diameter. Boring of the retaining wall would occur below ground level and would not be visible. A steel core drill unit would bore between the cable pit and caisson shaft as indicated by Figure 3.5 below. The steel core drill casing would remain within the bore holes to support the structure below ground.

Structural engineers would complete structural checks and potential additional monitoring and temporary protection of the retaining wall so that any adverse impacts are mitigated. A heritage and vibration assessment has been prepared for the Proposal and is summarised in Section 6.1 and Section 6.3 respectively.

The core drilling and installation of conduits through the retaining wall and into the concrete shaft will be completed following the installation of the concrete shaft itself. These works would approximately take two to three weeks.
Figure 3.5 Section view of works at the sandstone retaining wall at Chalmers Street entrance showing the cable pits within the garden area (cable pit EP5) and within the rail corridor (cable pit EP6)

**Chalmers Street substation**

To terminate the cable at Chalmers Street Substation, there will be installation of electrical infrastructure within the substation. This would include coring through the external wall to connect the feeder from the railway corridor, installation of cable trays, ladders, cabling, and amendments to the electrical busbar and protection system within the switchgear. This section of works is expected to take around four weeks.

Commissioning of the feeder would involve electrical testing and electrical termination works at both Chalmers Street Substation and Surry Hills Substation.

**Ancillary works**

The following ancillary works may also be required as part of the works:

- potential services relocation
- temporary site compounds for a site office, ablution block and meal room
- temporary construction and laydown areas within the existing rail corridor for storage of materials and equipment (refer to section 3.2 for additional details).
- Potential modifications to the existing site office within Prince Alfred substation, this may involve:
  - fixing whiteboards, breathalyser and sign-on machines to an internal wall
  - additional shelving and the installation of a sink unit and amendments to plumbing
  - installation of projector unit and screen
  - a 50 mm hole through the wall would be required to enable internet and power cables as needed
3.1.2 Engineering constraints

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

Existing structures:

Impact to heritage structures has been considered throughout the early stages of the design process. A number of construction methodologies have been implemented to ensure visual and structural impacts are removed or mitigated, this includes boring through the footing of heritage sandstone wall and installing brackets to existing structures with existing GST.

In order to access the Chalmers Street entrance garden, plant and machinery must traverse over a 0.6 metres tall heritage dwarf brick wall. Due to heritage constraints, a construction methodology is to be developed to access the park area without the need to dismantle and impact this wall.

Sydney Trains’ requirements: modifications for existing structures and new structures within the rail corridor must be designed and constructed with consideration of train impact loads, structural clearances to the track, and safe working provisions.

In addition, in order to construct the route inside the rail corridor safely, track possessions and isolations of the OHW are required. Possessions of this type (specifically of the Airport Line) are infrequent, with a small number scheduled each calendar year. The design has been developed in consideration of a feasible construction methodology which takes into account the number of available possessions.

Utilities: A Dial Before You Dig (DBYD) search has identified a number of utilities in the vicinity of the proposed works including:

- Sydney Trains and other external utility provider’s high voltage electrical services
- Water services
- Gas services
- Sydney Trains and other external utility provider’s communications services

3D point cloud laser scanning was also undertaken to identify buried services, additionally it is proposed to pothole within the Chalmers Street entrance garden, roads and Elizabeth Street footpath to confirm identified and non-identified buried utilities.

The design is thus heavily constrained with the presence of these utilities and having to maintain a safe clearance for these works.

Other considerations:

- the need to complete construction and commissioning of Feeder 7U5 in a timely manner so that existing Feeder 755 (which has on-going maintenance and reliability issues) can be decommissioned.
- avoiding impact to trees along the route where practical and feasible

3.1.3 Design standards

The Proposal would be designed having regard to the following

- relevant Australian Standards
- Asset Standards Authority standards
- Sydney Trains standards
- NSW Sustainable Design Guidelines – Version 4.0 (TfNSW, 2017c)
• other TfNSW policies and guidelines
• council standards where relevant.

3.1.4 Sustainability in design

The development of the concept design for the Proposal has been undertaken in accordance with the project targets identified in TfNSW’s Environmental Management System (EMS) and the NSW Sustainable Design Guidelines - Version 4.0 (TfNSW, 2017c) which groups sustainability into seven themes:

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

There are 14 compulsory requirements and two sub requirements that project teams are required to implement when there is confirmation that these individual initiatives are applicable to the project. Each compulsory requirement has an associated list of supporting initiatives.

These compulsory requirements have been reviewed and incorporated into the concept design (unless otherwise justified) and documented in a Sustainable Design Guidelines checklist that was approved by TfNSW (a summary is provided in Appendix C). The checklist and the requirements contained within would be reviewed again at the detailed design and construction phases, and submitted for approval by TfNSW.

3.2 Construction activities

3.2.1 Work methodology

Subject to approval, construction is expected to commence in May 2019 and take around 12 to 18 months to complete, depending on possession availability. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with TfNSW.

The potential construction activities for 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 Contractor’s preferred methodology, program and sequencing of work.
Table 3.1 Indicative construction staging for key activities

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activities</th>
<th>Timing</th>
</tr>
</thead>
</table>
| Potholing/service searching| • non-destructive excavation of slot trenches to locate services (potential concrete cutting in roads)  
                                 • backfilling of slot trenches and potholing  
                                 • geotechnical borehole drilling up to 9 m deep | Standard hours or night works (depending on location in street)          |
| Cable route construction   | • trenching and installation of CSR  
                                 • installation of above-ground GST  
                                 • concrete pit installation  
                                 • civil rise pit installation inside rail corridor | Standard hours or night works (depending on location in street) or 48-hour rail shutdown |
| Cable installation         | • installation and pulling of cables through cable pits and troughs         | Standard hours or night works (depending on location in street) or 48-hour rail shutdown |
| Demobilisation             | • high voltage commissioning of the feeder  
                                 • removal of site offices and laydown areas | Standard hours |

3.2.2 Plant and equipment

The plant and equipment likely to be used during construction include but are not limited to:

- Tipper Truck
- Asphalt Truck
- Bobcat
- Bogie
- Chipping Truck
- Concrete Pump
- Concrete Truck
- Crane Truck
- Crew Truck
- Drum Truck
- Elevated Work Platform
- Elevated Work Platform
- Excavator
- Lorry
- Roller
- Street Sweeper
- Sucker Truck
- Ute
- Winch Truck

3.2.3 Working hours

Some 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.

Certain works may need to occur outside standard hours and would include night works and works during routine rail possessions which are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed and trains are not operating.
Out of hours works are required in some cases to minimise disruptions to customers, pedestrians, motorists and nearby sensitive receivers; and to ensure the safety of railway workers and operational assets. Railway track possessions would be required to facilitate the following:

- service relocation within the rail corridor
- excavation of the cable pit within the rail corridor
- installation of GST and CSR within the rail corridor

Out of hours works may also be scheduled outside rail possession periods. Approval from TfNSW would be required for any out of hours work and the affected community would be notified as outlined in TfNSW’s *Construction Noise and Vibration Strategy* (TfNSW, 2018d) (refer to Section 6.3 for further details).

### 3.2.4 Earthworks

Excavations and earthworks would generally be required for the following:

- potholing or Non-Destructive Digging (NDD) to locate underground services and/or utilities
- trenching along the footpath, median strip and road corridors of Elizabeth Street, Commonwealth Street, Albion Street and Ann Street
- boring through the sandstone retaining wall
- underboring of Sydney Light Rail and Eddy Avenue
- excavation of civil pits
- installation of free-standing GST posts

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

### 3.2.5 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 the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017c). Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

### 3.2.6 Traffic access and vehicle movements

The Proposal would require temporary changes to existing traffic and access such as road closures, footpath closures and parking relocation. Truck movements as a result of the Proposal are not expected to increase local traffic volumes. Traffic and transport impacts associated with the Proposal are assessed in Section 6.1 of this REF.

### 3.2.7 Ancillary facilities

A number of temporary construction compounds would be required to accommodate a site office, amenities, laydown and storage area for materials. The area nominated for the compound is on land owned by Sydney Trains and crown land. Impacts associated with utilising these areas have been considered in the environmental impact assessment including requirements for rehabilitation.
A site office may be established within an existing office within Prince Alfred substation. A number of temporary site establishment and laydown areas have been identified and assessed as potential options for the project (refer to Figure 1.1):

- Laydown area within the footpath area along Elizabeth Street with necessary machines, temporary fencing, materials and services for staff
- Laydown area at Chalmers Street entrance garden for equipment, temporary fencing, materials and services for staff
- Laydown area utilising a section of the carpark south of the Sydney Trains Depot for equipment, temporary fencing, materials and services for staff
- Site compound area within the rail corridor of the Mortuary Station siding which occurs within a cutting and would therefore not be visible from Mortuary Station itself or Central Station platforms.

3.2.8 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 signals, communications, water, drainage and sewerage, but such relocation is unlikely to occur outside of the footprint of the works assessed in this REF. In the event that works would be required outside of this footprint, further assessment would be undertaken. The appropriate utility providers would be consulted during the detailed design phase.

3.3 Property acquisition and land ownership

The 1.2 km Proposal route occurs on land owned by three parties: Sydney Trains, City of Sydney Council and the Crown. The Central Station property is owned by Sydney Trains, the road corridor is owned by City of Sydney Council, with the footpath and median strip owned by the Crown. While there is an easement over part of the Crown land that allows construction of electricity cables for railway purposes it is likely that an additional area will be needed to accommodate the cables. TfNSW will consult Crown Lands and if required acquire the necessary easement. Private land acquisition will not be undertaken as part of this proposal.

3.4 Operation management and maintenance

The future operation of the new feeder would be maintained by Sydney Trains. However there are no maintenance requirements for the new feeder during its 50 year design life. Repair works would only be required to the cable if damaged.
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 (NES)'.

The EPBC Act requires the assessment of whether the Proposal is likely to significantly impact on matters of NES or Commonwealth land. These matters are considered in full in Appendix A.

The Proposal would not impact on any matters of NES or on Commonwealth land. Therefore 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 do not require development consent under Part 4 of the Act.

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 regulations

Table 4.1 provides a list of other relevant legislation applicable to the Proposal.
<table>
<thead>
<tr>
<th>Applicable legislation</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biodiversity Conservation Act 2016 (BC Act) (NSW)</strong></td>
<td>The site does not contain suitable habitat for any listed threatened species or community and is unlikely to have a significant impact on any threatened species or community (refer Section 6.7).</td>
</tr>
<tr>
<td><strong>Biosecurity Act 2015 (NSW)</strong></td>
<td>Clause 22 requires 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. Appropriate management methods would be implemented during construction if declared noxious weeds in the City of Sydney Council LGA are identified (refer to Section 6.7).</td>
</tr>
<tr>
<td><strong>Contaminated Land Management Act 1997 (CLM Act) (NSW)</strong></td>
<td>Section 60 of the CLM Act imposes a duty on landowners to notify the Office of Environment and Heritage (OEH), and potentially investigate and remediate land if contamination is above EPA guideline levels. The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8).</td>
</tr>
<tr>
<td><strong>Crown Land Management Act 2016 (NSW)</strong></td>
<td>The Proposal would involve potholing, trenching and the installation of CSR within the footpath and median strip on Elizabeth Street which is partially owned by the Crown. Consultation has been undertaken to access the property however property acquisition is not required for the Proposal. If any additional easements are required for the Proposal this will be acquired prior to the works commencing.</td>
</tr>
</tbody>
</table>
| **Heritage Act 1977 (Heritage Act) (NSW)** | • Sections 57 and 60 (approval) are required where items listed on the State Heritage Register are to be impacted  
• Sections 139 and 140 (permit) are required where relics are likely to be exposed  
• Section 170 assessment are required where items listed on a government agency Heritage and Conservation Register are to be impacted.  
The Proposal partially occurs within the Sydney Terminal and Central Railway Stations Group, which is listed on the State Heritage Register. A Section 60 approval is required for works within the Central Station State Heritage Register (SHR) curtilage. Construction activities would likely impact significant fabric including trees and the retaining wall footing the Chalmers Street Entrance.  
The potential archaeological remains outside the Central Station SHR curtilage are considered ‘works’ and do not trigger the relics provisions of the Heritage Act. If relics are encountered during construction a Section 140 approval would be required.  
An additional approval would be required if state-significant archaeology associated with the Devonshire Street Cemetery or human skeletal remains are encountered. This would require notification to the NSW Police and Heritage Division. Advice from a physical anthropologist, together with an Exhumation Policy and mitigation strategies would be developed and implemented prior to commencing such activities if required.  
A heritage (including archaeological) assessment has been undertaken for the Proposal and is summarised in Section 6.5. The assessment concluded that the Proposal would have a neutral impact on the heritage significance of the Central Station. |
<table>
<thead>
<tr>
<th>Applicable legislation</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>National Parks and Wildlife Act 1974 (NPW Act) (NSW)</em></td>
<td>Sections 86, 87 and 90 of the NPW Act require consent from OEH for the destruction or damage of Indigenous objects. The Proposal is unlikely to disturb any Indigenous objects (refer Section 6.4). 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.</td>
</tr>
<tr>
<td><em>Protection of the Environment Operations Act 1997 (PoEO Act) (NSW)</em></td>
<td>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. However, in accordance with Part 5.7 of the PoEO Act, TfNSW would notify the EPA of any pollution incidents that occur onsite. This would be managed in the CEMP to be prepared and implemented by the Construction Contractor.</td>
</tr>
<tr>
<td><em>Roads Act 1993 (Roads Act) (NSW)</em></td>
<td>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. No approvals under the Roads Act are required. The Proposal would involve works on local roads managed and maintained by City of Sydney Council. The works would be undertaken with City of Sydney Council including obtaining Road Occupancy Licence(s) for temporary road closures to facilitate works where required. A traffic, transport and access assessment has been undertaken for the Proposal and is summarised in Section 6.1.</td>
</tr>
</tbody>
</table>

### 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 which part of the EP&A Act an activity or development may be assessed.

Clause 79 of the Infrastructure SEPP allows for the development of ‘rail infrastructure facilities’ by or on behalf of a public authority without consent on any land (i.e. assessable under Part 5 of the EP&A Act). Clause 78 defines ‘rail infrastructure facilities’ as including elements such as ‘railway stations, station platforms and areas in a station complex that commuters use to get access to the platforms’, public amenities for commuters’ and ‘associated public transport facilities for railway stations’.

Consequently, development consent is not required for the Proposal which is classified as a rail infrastructure facility, however the environmental impacts of the Proposal have been assessed under the provisions of Division 5.1 of the EP&A Act.

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 5.1 of this REF discusses the consultation undertaken under 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, 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 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 6.8 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 rail corridor. In the event the requirement for remediation works are identified during construction, this would be undertaken in accordance with this SEPP.

4.3.3 Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Harbour REP) is currently being consolidated with other planning instruments as part of the Department of Planning and Environment’s SEPP Review Program and is considered at a state level. The Harbour REP aims to protect, enhance and maintain the catchment, foreshores, waterways and islands of Sydney Harbour and its tributaries.

Although the proposal is within the broader catchment of the Sydney Harbour Catchment, it is not located within any of the areas listed in the areas listed by clause 3(2); therefore the provisions of the Harbour REP do not apply.

4.4 Local environmental planning instrument and development controls

The Proposal is located within the City of Sydney LGA. The provisions of the Infrastructure SEPP mean that Local Environmental Plans (LEPs), prepared by councils for an LGA, do not apply. However, during the preparation of this REF, the provisions of Sydney Local Environment Plan 2012 (Sydney LEP) were considered.

4.4.1 Sydney Local Environmental Plan 2012

The Sydney LEP is the governing plan for the City of Sydney LGA, including Haymarket and Surry Hills. Table 4.2 summarises the relevant aspects of the Sydney LEP applicable to the Proposal. Figure 4.1 shows the relevant section of the zoning map from the Sydney LEP, with the indicative location of the Proposal.
Figure 4.1 Land use zones
Table 4.2 Relevant provisions of the Sydney LEP

<table>
<thead>
<tr>
<th>Provision description</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause 2.3 – Zone objectives and Land Use Table</td>
<td><strong>Applicable land zones</strong> Under the Sydney LEP, the Proposal is located in areas zoned as: • SP2 Infrastructure (Rail) for the proposed works associated with Central Station • B4 Mixed Use for works associated with Eddy Avenue, Albion Street and Commonwealth Street • RE1 Public Recreation for the works associated with Elizabeth Street footpath • R1 General Residential for works associated with Ann Street <strong>Zone objectives</strong> The objectives of the applicable land zones are as follows: • SP2 Infrastructure (Rail) – to provide for infrastructure and related uses and to prevent development that is not compatible with or that may detract from the provision of infrastructure • B4 Mixed Use – to provide a wide range of retail, business, office, entertainment, community and other suitable land uses that serve the needs of the local and wider community. • RE1 Public Recreation – enable land to be used for public open space or recreational purposes and to protect and enhance the natural environment for recreational purposes • R1 General Residential – to provide the housing needs of the community and provide for a variety of housing types and densities The Proposal is consistent with the objectives of SP2 infrastructure and would not impact the zone objectives of B4 Mixed Use, RE1 Public Recreation or R1 General Residential once in operation. <strong>Permissible development within land zones</strong> Development for the purposes of a rail infrastructure facility is permissible with consent under the provisions of the SP2 Infrastructure (Rail) zone, B4 Mixed Use, RE1 Public Recreation, R1 General Residential and road development is permissible with consent under the zones. However, as the provisions of the Infrastructure SEPP prevail over the Sydney LEP, development consent from Sydney Council is not required.</td>
</tr>
<tr>
<td>Clause 5.10 – Heritage Conservation</td>
<td>Clause 5.10 of the Sydney LEP provides for the protection of items, places and archaeological sites which have been identified in the Sydney LEP as having heritage significance. A series of heritage items and conservation areas are listed on the Sydney LEP in the immediate vicinity of the Proposal including: • Belmore Park grounds, landscaping and bandstand • Reservoir Street Heritage Conservation Area • Albion Estate Heritage Conservation Area • Former ‘Railway Institute’ Building • Former Children’s Court Building, Including Interior • Former ‘William Booth Institute’ Including Interior A discussion of potential impacts to local heritage and the requirements for consent is provided in section 6.5.</td>
</tr>
</tbody>
</table>
Provision description | Relevance to the Proposal
--- | ---
Clause 7.14 – Acid Sulfate Soils (ASS) | The Botany Bay Acid Sulfate Soil Risk Map – Edition Two (Department of Land and Water Conservation [DLWC], 1997) was reviewed to assess the potential for acid sulfate soils (ASS) at the Proposal site. The map indicated the area contained ‘No Known Occurrence’ in regards to ASS risk. Additionally no observations (staining, odour) were noted during field works in February 2019 that were indicative of ASS.

Clause 7.15 – Flood planning | The Proposal site is not located on land that is mapped as flood prone.

## 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

<table>
<thead>
<tr>
<th>Policy/Strategy</th>
<th>Commitment</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NSW: Making It Happen</strong> (NSW Government, 2015)</td>
<td>In September 2015, the NSW Government announced a series of State Priorities as part of <em>NSW: Making It Happen</em> (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. <em>NSW: Making it Happen</em> 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. One of the 12 priorities identified as part of <em>NSW: Making It Happen</em> relates to investment in building infrastructure. The ongoing development and investment in transport infrastructure is identified as part of the wider building infrastructure priority.</td>
<td>The Proposal assists in meeting the priority by providing key electrical infrastructure to the transport network and encouraging greater use of public transport.</td>
</tr>
<tr>
<td>Policy/Strategy</td>
<td>Commitment</td>
<td>Comment</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Future Transport Strategy 2056** (TfNSW 2018a)   | *Future Transport Strategy 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. 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. The strategy outlines 6 state-wide outcomes  
  - customer focused  
  - successful places  
  - a strong economy  
  - safety and performance  
  - accessible services  
  - sustainable.                                                                                     | The Proposal would deliver on the customer focus outcomes by enabling the transport network of both Sydney Trains and future Sydney Metro.                                                                 |
| **Building Momentum State Infrastructure Strategy 2018-2038** (Infrastructure NSW 2018) | *The State Infrastructure Strategy 2018-2038* is a strategy to plan and fund the infrastructure that the NSW Government delivers over the next 20 years. Public transport is viewed as critical to productivity, expanding employment opportunities by connecting people to jobs, and reducing congestion. | The Proposal invests in power supply for public transport use so that it provides a service that benefits a wider range of customers.                                                                 |
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 Feeder 7U5 project. 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.
Community and stakeholder consultation

There is likely to be community and stakeholder interest in work associated with Central Station and nearby streets, based on experience with projects currently underway in the area which has informed our engagement approach. This chapter summarises consultation by Transport for NSW, and the planned community and stakeholder engagement activities to be undertaken to support the public display of the REF.

Key stakeholders have informed the development of the Feeder 7U5 project and include the Office of Environment and Heritage (OEH), City of Sydney Council officers, Ausgrid and public utilities and agencies within TfNSW including Sydney Trains, Sydney Metro, Sydney Coordination Office and Sydney Light Rail.

TfNSW’s understanding of work in this area has also been informed by previous project experience in and around Central Station, as well as feedback from the community on these projects. This has informed the project’s development and initiatives to minimise disruption. Community feedback through the public display of the REF will provide further opportunities to identify concerns and improve project delivery.

Transport for NSW has established and maintained ongoing consultation with key government agencies regarding the development of the project. Regular meetings between these stakeholders and the project team have been held, as well as others such as utility companies, focussing on routes and design, particularly:

- Options assessment workshops with relevant TfNSW and Sydney Trains representatives
- Sydney Coordination Office and Sydney Light Rail workshops – options were presented to key stakeholders from Sydney Coordination Office, Sydney Light Rail, and City of Sydney Council officers for feedback. This included construction approach and traffic management.
- OEH – meetings were held with project heritage advisors and OEH to discuss potential heritage impacts and how these would be managed

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 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 5.1 provides details of consultation requirements under the Infrastructure SEPP for the Proposal.
<table>
<thead>
<tr>
<th>Clause</th>
<th>Clause particulars</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
</table>
| **Clause 13 | Consultation with Councils – development with impacts on council related infrastructure and services** | Consultation is required where the Proposal would result in:  
- substantial impact on stormwater management services  
- generating traffic that would place a local road system under strain  
- connection to or impact on a council owned sewerage system  
- connection to and substantial use of council owned water supply  
- significantly disrupt pedestrian or vehicle movement  
- significant excavation to a road surface or footpath for which Council has responsibility. | The Proposal includes works that would:  
- require impacts to the stormwater system  
- disrupt pedestrian and vehicle movements during construction  
- impact on road pavements under Council's care and control  
- impact on Council-operated footpaths.
Consultation with City of Sydney Council officers has been undertaken and would continue throughout the exhibition period, detailed design and construction phases. |
| **Clause 14 | Consultation with Councils – development with impacts on local heritage** | Where construction works:  
- substantially impact on local heritage item (if not also a State heritage item)  
- substantially impact on a heritage conservation area. | The Proposal would occur within the heritage conservation areas of Reservoir Street and Fosterville Heritage Conservation Area and Albion Estate Heritage Conservation Area.
The Proposal also occurs within the Belmore Park listing of the Sydney LEP.
Consultation with City of Sydney Council has been undertaken and would continue throughout the detailed design and construction phases. Non-Indigenous heritage impacts are discussed in Section 6.5. |
| **Clause 15 | Consultation with Councils – development with impacts on flood liable land** | Where construction works:  
- impact on land that is susceptible to flooding – reference would be made to Floodplain Development Manual: the management of flood liable land. | The Proposal is not located on land that is susceptible to flooding. The closest mapped flood prone land is approximately 1.5 km away near Rushcutters Creek in Paddington.
Accordingly, consultation with Council is not required in regard to this aspect. Refer to Section 6.9. |
| **Clause 15A | Consultation with Councils – development with impacts on certain land within the coastal zone** | Where construction works:  
- impact on land that is within a coastal vulnerability area and is inconsistent with a certified coastal management program that applies to that land. | The Proposal is not located on land that is within a coastal vulnerability area. Accordingly, consultation with Council is not required in regard to this aspect. |
<table>
<thead>
<tr>
<th>Clause</th>
<th>Clause particulars</th>
<th>Relevance to the Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clause 15AA</td>
<td>Consultation with State Emergency Service—development with impacts on flood liable land</td>
<td>Where construction works are located on flood liable land consultation with State Emergency Services is required.</td>
</tr>
<tr>
<td>Clause 16</td>
<td>Consultation with public authorities other than Councils</td>
<td>For specified development which includes consultation with the OEH for development that is undertaken adjacent to land reserved under the National Parks and Wildlife Act 1974, and other agencies specified by the Infrastructure SEPP where relevant. Although not a specific Infrastructure SEPP requirement, other agencies TfNSW may consult with could include: Roads and Maritime, Sydney Trains, OEH.</td>
</tr>
</tbody>
</table>

### 5.2 Consultation approach

A consultation strategy for the Proposal has been developed to encourage stakeholder and community involvement and foster interaction between stakeholders, the community and the project team. The consultation strategy that has been developed, 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 the specialist environmental investigations
- ensure that the directly impacted community are aware of the REF and consulted
- provide opportunities for stakeholders and the community to express their view about the Proposal
- understand and access valuable local knowledge from the community and stakeholders
- record the details and input from community engagement activities
- ensure a comprehensive and transparent approach.

### 5.3 Public display

The REF display strategy adopts a range of consultation mechanisms, including:

- public display of the REF at various locations
• A community drop in session
• Distribution of a project overview newsletter to the local community along the route, outlining the Proposal and inviting feedback on the REF
• Website information for customers, road users and the wider community
• Advertisement of the REF public display in local newspapers with a link to the TfNSW website that includes a summary of the Proposal and information on how to provide feedback
• Ongoing consultation with Council, Sydney Trains and other stakeholders.

Community consultation activities for the Proposal will be undertaken during the public display of this REF. The REF will be displayed for a period of two weeks, between 5 April and 19 April.

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

1. Sydney City Library Haymarket, 744 George Street, Haymarket
2. Surry Hills Library, 405 Crown Street, Surry Hills
3. Transport for NSW Office, Level 5, Tower A, Zenith Centre, 821 Pacific Highway, Chatswood

The REF will also be available online at transport.nsw.gov.au/projects. Information on the Proposal will also be available through the Project Infoline (1800 684 490) or by email – projects@transport.nsw.gov.au. During this time feedback is invited. Following consideration of feedback received during the public display period, TfNSW will respond to feedback, determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

5.4 Ongoing consultation

At the conclusion of the public display period for this REF, TfNSW will respond to feedback from each respondent. The issues raised by the respondents would be considered by TfNSW before determining whether to proceed with the Proposal (refer Figure 1.1).

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.
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 impact on 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, transport and access

A Traffic, Transport and Access Assessment was prepared by SLR Consulting in March 2019 for the Proposal, consisting of a desktop analysis and site visit. The assessment is attached in Appendix D (SLR Consulting, 2019a). The following sections summarise the potential impacts to road and rail users during the construction and operation stages of the Proposal, and provide mitigation measures to reduce these impacts.

6.1.1 Existing environment

The Proposal is within the Sydney inner city suburb of Surry Hills. Surry Hills contains a mixture of residential, commercial, rail infrastructure and light industrial areas.

The area is generally identified as being cyclist friendly, offering a number of off-road shared paths along Elizabeth Street, Eddy Avenue, east of Central Station and Commonwealth Street.

Neighbouring construction works for Sydney Light Rail and Sydney Metro have altered the pre-existing traffic and access conditions.

Surrounding road network

Aside from the rail areas the Proposal will be undertaken within the road corridor. The roads and lane configurations vary from as many as 6 traffic lanes to 2 traffic lanes. Table 6.1 summarises the network of roads within the Proposal route.

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Lane Configuration</th>
<th>Footpaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth Street</td>
<td>6 Traffic Lanes (2-way) + 2 Bus Lanes</td>
<td>Shared path (west) + footprint (east)</td>
</tr>
<tr>
<td>Eddy Avenue</td>
<td>5 Traffic Lanes (2-way)</td>
<td>Footpaths both sides.</td>
</tr>
<tr>
<td>Albion Street</td>
<td>4 Traffic Lanes (2-way) to 2 Traffic Lanes (1-way)</td>
<td>Footpaths both sides.</td>
</tr>
<tr>
<td>Commonwealth Street</td>
<td>2 Traffic Lanes (2-way)</td>
<td>Footpaths both sides.</td>
</tr>
<tr>
<td>Ann Street</td>
<td>2 Traffic Lanes (2-way)</td>
<td>Footpaths both sides.</td>
</tr>
</tbody>
</table>
Parking

On-street parking is present within the study area along Albion Street, Commonwealth Street and Ann Street. Along the Proposal route timed and residential parking is located on Ann Street, Commonwealth Street. Adjacent to the Proposal route timed and residential parking is available on Mary Street, Smith Street and Commonwealth Street.

Pedestrian and cycle access

Within the study area there are a number of pedestrian routes and facilities that provide access to Central Station and the Surry Hills district. Along Chalmers Street there is a Sydney Trains staff only shared path between the entrance to Central Station and Eddy Avenue. Ann Street, Commonwealth Street and Albion Street all have pedestrian footpaths on each side of the road. Elizabeth Street has a shared pedestrian and cycle path running adjacent the road and onto Eddy Avenue. Refer to Figure 6.1 for a map of the local pedestrian routes within the footprint of the project.

![Figure 6.1 Local Pedestrian routes within the project area](image)

Within the study area there are two routes generally identified as cyclist friendly which include the following:

- Off-road shared paths along Elizabeth Street, Eddy Avenue and bordering the east of Central Station.
- A low-traffic on-road quiet route designated along Commonwealth Street.

There are no locations for parking or storage of bicycles in the local area.

6.1.2 Potential impacts

a) Construction phase

Construction activities are anticipated to impact pedestrian and road users due to temporary restricted access to most of the construction areas. Impacts will vary during the construction program as the location of the works progress along the route.
Works will occur both during and outside standard construction hours as well as on weekends (including Saturday and Sunday) and weekdays. Work will be scheduled to minimise impacts to highly trafficable areas where practicable.

**Haulage routes**

The project is surrounded by roads with no direct access available to larger vehicles (B-Doubles and above). Vehicles of this size have not been identified for construction activities therefore direct access to the site via these roads is not considered mandatory. The largest proposed vehicle for construction is the size of a Heavy Rigid Vehicle (HRV). HRVs would be required to travel via the regional roads to reach the site.

Regional roads classified by Roads and Maritime surrounding the project include Chalmers Street, Elizabeth Street, Eddy Avenue, Foveaux Street and Albion Street. Figure 6.2 shows the regional and state roads suitable for use by heavy vehicles. Exact routes of heavy vehicles would be refined during the construction process to match the staging of the works and road access.

![Figure 6.2 State and Regional Roads](Source: https://maps.nsw.gov.au)

**Pedestrian and Cyclist Impacts**

The proposal will impact both the pedestrian and cyclist access for the duration of works. Construction outside the rail corridor will likely have an impact during trenching and cable pulling along the road corridor. Several road closures and detours will be required to facilitate the works.

The closure of the Sydney Trains staff only pedestrian walkway from Central Station to the Sydney Trains Depot is considered to cause minor impact. This walkway is used only by Sydney trains staff and suitable detours can be implemented.

Throughout the proposed works the pedestrian cycleway shared path between Chalmers Street entrance to Central Station and Eddy Avenue would remain open, with minimal
interruption by construction vehicles entering and exiting site. Any closure of this path would be limited to night works where feasible.

Elizabeth Street pedestrian and cyclist shared path may require temporary closure and detours during the construction, especially during initial services searching. Closure of this pathway would be avoided where possible, however if required detours to the opposite side (eastern) of Elizabeth Street would be implemented.

Commonwealth Street, Albion Street and Ann Street pedestrian footpaths may be impacted by trenching depending on the final detailed design. The widths of footpaths in these streets vary considerably. If closure of any of these footpaths is required pedestrian detours would be implemented with care taken to minimise interactions with any traffic access. Building access would be maintained to business and residential properties.

**Traffic Impacts**

Construction of the Proposal would result in a minor temporary increase in traffic as a result of the following:

- delivery of construction materials
- delivery and removal of construction equipment and machinery
- movement of construction personnel.

Construction equipment may be required to be transported to site via a truck and confined to within the work areas. The majority of construction traffic would either be Medium Rigid Vehicles (MRV) or HRVs. Where oversize vehicles such as Articulated Vehicles may be required for certain activities, specific permits would be obtained from the City of Sydney Council. Heavy vehicles and articulated vehicles will be restricted to non-peak periods where possible to minimise disruptions to traffic.

There will be occasions where partial or full road closures are necessary. Typically the closures will relate to the trenching and cabling works which run across or along roads. The following roads would be directly impacted by project construction activities:

- Eddy Avenue
- Elizabeth Street
- Albion Street
- Commonwealth Street
- Ann Street.

The CSR will cross Eddy Avenue via underbore. Temporary bore pits will be constructed at either side of Eddy Avenue. The underboring should not require closure of Eddy Avenue however other tasks such as service searching or transporting equipment may require partial closures that will generally occur outside peak periods.

Elizabeth Street will be crossed by the CSR to reach Albion Street. Trenching will require either staged partial closures or a full road closure depending on the construction methodology. Staging of the works to retain two-way access and bus routes would be the preferred methodology if practical.

The CSR route is proposed along Albion Street either within the footpath or road pavement pending service and geotechnical investigations. Should trenching occur within the road corridor it is likely that one lane could remain for eastbound traffic for the first 75 metres of Albion Street. Restricted 1 hour parking or residential parking (7 spaces) is located adjacent to residential properties and if closed would need to be absorbed on nearby local streets. Temporary closure of the bus-only parking area outside the Rydges Hotel may adversely
impact the business. Alternative bus parking locations would be provided when developing the temporary traffic controls.

The CSR along Commonwealth Street would be installed either within the footpath or road pavement pending further design investigations. Parking within the construction footprint consists of Salvation Army parking (2 spaces) and 1hr parking unrestricted for residents (5 spaces). If trenching in the road is to occur then 2 way traffic could be maintained. However, closure of parking spaces would need to be accommodated on nearby local streets. Vehicle access to Little Albion Street may also be temporarily impacted.

Visual inspection of Ann Street indicates that if trenching is required in the road for the CSR route then traffic access and parking would be constrained due to the narrow width. Contra flow traffic controls would likely be required to maintain access along this road. Residential parking in this area includes up to 20 vehicle spaces and several private off street parking spaces that may be impacted by the work. The proposal would aim to maintain parking along this street due to the reliance by local residents.

**Construction access / Staff Parking**

Access to laydown and work areas would generally be through the regional road network. The laydown area at Erskineville Substation would be accessed via Railway Parade which is not a State or Regional Road. Where oversized vehicles may be required to utilise local roads a permit would be obtained from the City of Sydney’s Construction Regulation Unit.

The Sydney Trains Depot would be accessed via the existing driveway off Chalmers Street. This driveway is already utilised by vehicles up to HRV size. Limited parking will be available for staff at the Sydney Trains Depot.

Access to the garden site area adjacent to the Chalmers Street Entrance to Central Station would be via a temporary access point off either Chalmers Street or Eddy Avenue and crossing both the current light rail construction area and existing pedestrian/cyclist shared path. The exact positioning of this access point would need to be such that construction vehicles are able to enter and exit to the external road network in a single manoeuvre and in a forward direction. Staff parking may be available at this location depending on the final work zone.

The Elizabeth Street work area would require temporary access on the corner of Eddy Avenue and Elizabeth Street. Vehicles must be able to both enter and exit in a forward direction, and so in consideration of the narrowness of the site, a separate entry and exit may need to be provided.

Mortuary Station site compound would be accessed via Lee Street through the adjacent bus depot and would be unlikely to impact upon bus services. This site has a relatively large amount of available space and sits within the western side of the rail corridor, potentially catering for staff parking alongside the proposed site offices.

**b) Operational phase**

The proposed cable route is either underground or within GST along existing GST routes. It is considered that the Proposal would not have significant impacts on the traffic and transport access in the area. It is noted that cable maintenance and pulling pits installed along the route of the CSR could impact traffic depending on the final locations.

**6.1.3 Mitigation measures**

To effectively manage and mitigate the impacts of project construction activities on the public, a construction Traffic Management Plan (TMP) inclusive of detailed Traffic Control
Plans (TCP) would need to be prepared in consultation with Roads and Maritime Services and City of Sydney. The TMP would include:

- the construction approach and staging measures to minimise extent of work areas
- details of construction traffic demands and routes required
- ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised
- maximising safety and accessibility for pedestrians and cyclists
- ensuring adequate sight lines to allow for safe entry and exit from the site
- ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made)
- managing impacts and changes to on and off street parking and requirements for any temporary replacement provision
- parking locations for construction workers away from stations and busy residential areas and details of how this will be monitored for compliance
- routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses
- details for relocating kiss and ride, taxi ranks and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired
- 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.

Refer to Table 7.1 for a full list of proposed mitigation measures

6.2 Urban design, landscape and visual amenity

6.2.1 Existing environment

The Proposal traverses an urbanised and modified landscape occurring within an environment dominated by rail infrastructure, commercial buildings within Haymarket and residential properties within Surry Hills. The visual landscape consists of a range of medium and high levels of existing development.

6.2.2 Potential impacts

a) Construction phase

Construction activities would result in temporary landscape and visual amenity impacts to nearby residents, businesses and road users due to:

- construction vehicle movements around laydown, compound and construction sites
• temporary fencing, road barriers, signage gates and lighting towers
• general construction activities including trenching, potholing, stockpiling of materials and the parking of plant and other work vehicles
• potential light spill during night works

Consideration has been given to visual impacts of the potential site compound site near Mortuary Station, a state significant heritage item. The location of this potential site compound would occur within a cutting and would not be visible from either Central or Mortuary Stations.

With the exception of work during railway possessions, most works are anticipated to be undertaken during standard construction hours. Where night works are required, this would involve the use of temporary lighting for operational, safety and security purposes. Lighting installations would be placed to avoid light spill to adjoining road corridors and residential areas.

The potential removal of trees within Chalmers Street entrance garden for access requirements would have a noticeable impact to the landscape character of the garden itself. Adverse impacts would be mitigated by reinstatement and restoration of the landscape following completion of works.

Trenching works may necessitate the removal of three trees along Elizabeth Street footpath, Albion Street, Commonwealth Street and Ann Street which would have a noticeable impact to the landscape character of the locality. Further trees may be require removal subject to further investigation and arborist assessment during trenching works. An arborist assessment has been prepared for the Proposal and is summarised in section 6.7.

b) Operational phase

Outside of Central Station the feeder and cable pits are installed entirely below ground level. Within the rail corridor, the feeder would be installed beside existing rail and electrical infrastructure which would not result in a noticeable visual impact. Works to the Chalmers Street entrance retaining wall footing below ground level and would not be visible. As such, the overall impact to landscape and visual amenity would be low.

A setting, view and landscape assessment was also undertaken as part of the heritage assessment of Central Station which concluded that the Proposal would not impact its character or interfere with significant views or vistas to or from Central Station (Appendix F).

6.2.3 Mitigation measures

The overall visual impacts of the Proposal are low for the surrounding visual receiver locations. The following mitigation measures would be considered during design development and construction planning to minimise the level of visual impact of the construction phase of the Proposal:

• Vegetation to be retained where practical and feasible
• Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.
• Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.
• During construction, graffiti would be removed in accordance with TfNSW’s Standard Requirements
• Light spill from the construction area into adjacent visually sensitive properties would be minimised by directing construction lighting into the construction areas and
ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution. Refer to Table 7.1 for a full list of proposed mitigation measures.

6.3 Noise and vibration

This section provides a summary of the *Noise and Vibration Impact Assessment* prepared by SLR Consulting (2019). The assessment is attached in Appendix E (SLR Consulting, 2019b). The assessment included background ambient noise monitoring and noise modelling for various stages of construction works to predict the potential impacts of the Proposal on noise and vibration.

6.3.1 Existing environment

The proposal is located within an urban environment with variable road noise from major roads such as Elizabeth Street, Foveaux Street and Devonshire Street. Noise generated by train operations at Central Station and general city noises also affect the majority of the proposal area. The Proposal route is proposed through a mix of residential, rail infrastructure and commercial properties.

Background noise levels

To assist in determining noise criteria for the receivers surrounding the Proposal, four noise catchment areas (NCA) were identified. The noise environment at each of the residential receivers within each NCA is considered to be comparable. The locations of the residential receivers and the four NCAs are shown in Table 6.2.

Table 6.2 Noise Catchment Areas and Surrounding Land Use

<table>
<thead>
<tr>
<th>NCA</th>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCA01</td>
<td>Surry Hills</td>
<td>Typically residential land use with some light commercial and public buildings</td>
</tr>
<tr>
<td>NCA02</td>
<td>Surry Hills, Redfern</td>
<td>Mostly light commercial with some residential land use</td>
</tr>
<tr>
<td>NCA03</td>
<td>Haymarket, Darlington</td>
<td>Mostly residential to the south-west of the project with some light commercial use</td>
</tr>
<tr>
<td>NCA04</td>
<td>Central Station</td>
<td>Rail Corridor, public transportation hub and heritage listed structures.</td>
</tr>
</tbody>
</table>

Unattended noise monitoring was previously completed in June/July and September of 2015 for the Sydney Metro project. Noise monitoring locations were located in NCA2 and NCA3 as shown in Figure 6.3. These measurements have been used to establish an existing noise environment and background criteria. A summary of the noise monitoring results from 2015 is provided in Table 6.3.
Table 6.3 Summary of existing ambient noise levels

<table>
<thead>
<tr>
<th>Noise Monitoring Location</th>
<th>Measured Noise Level (dBA)</th>
<th>Background Noise (RBL)</th>
<th>Average Noise (LAeq)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime</td>
<td>Evening</td>
<td>Night</td>
</tr>
<tr>
<td>B09</td>
<td>56</td>
<td>53</td>
<td>45</td>
</tr>
<tr>
<td>B10</td>
<td>51</td>
<td>50</td>
<td>49</td>
</tr>
</tbody>
</table>

To supplement the unattended monitoring additional attended monitoring was conducted in NCA1, on Ann Street, Surry Hills on 17 and 18 December 2018. Attended noise monitoring was completed during day and night to capture background noises in both periods. Attended noise monitoring is summarised in Table 6.4.

Table 6.4 Attended noise monitoring results

<table>
<thead>
<tr>
<th>Period</th>
<th>Measurement details</th>
<th>Measured Noise Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LA90</td>
</tr>
<tr>
<td>Daytime</td>
<td>18 Dec 2018 10:30am</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>18 Dec 2018 10:50am</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>18 Dec 2018 11:07am</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>18 Dec 2018 11:22am</td>
<td>48</td>
</tr>
<tr>
<td>Nightime</td>
<td>17 Dec 2018 10:23pm</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>17 Dec 2018 10:39pm</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>17 Dec 2018 10:56pm</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>17 Dec 2018 11:12pm</td>
<td>43</td>
</tr>
</tbody>
</table>

Monitoring determined that the existing noise environment of the four catchments are characterised by road and rail traffic as well as general urban noise.
Figure 6.3 Residential receiver locations and noise catchment areas
Construction 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. The ICNG recommends standard hours of construction as:

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

Noise management levels (NMLs) have been determined for receivers in accordance with the ICNG. The ICNG outlines NMLs for non-residential receivers such as commercial properties, schools and places of worship. NMLs for receivers are calculated based on rating background level (RBL) + 10dB(A) (for daytime periods) or the RBL + 5dB(A) (for evening and nighttime periods).

Where works exceed the noise management levels, all reasonable and feasible measures (such as equipment selection and location, construction scheduling and respite periods) should be implemented to reduce noise levels as far as practicable.

The construction NMLs calculated for residential receivers are listed in Table 6.5.

Sleep disturbance noise goals have also been established for residential receivers which are based on the *NSW Roads Noise Policy* (Department of Environment, Climate Change and Water, 2011). Based on the Policy, the sleep disturbance criteria for the NCAs are a screening level of 58-64 dBA $L_{A1(1 \text{ minute})}$.

Table 6.5 Residential receiver Noise Management Level (dBA $L_{Aeq. 15\text{minute}}$) for construction works

<table>
<thead>
<tr>
<th>NCA</th>
<th>RBL</th>
<th>Standard Construction (RBL+10dB)</th>
<th>Out of Hours (RBL+5dB)</th>
<th>Sleep Disturbance Screening (RBL+15dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Daytime</td>
<td>Daytime</td>
<td>Daytime</td>
<td>Evening</td>
</tr>
<tr>
<td>NCA1</td>
<td>48</td>
<td>58</td>
<td>53</td>
<td>51</td>
</tr>
<tr>
<td>NCA2</td>
<td>56</td>
<td>66</td>
<td>61</td>
<td>58</td>
</tr>
<tr>
<td>NCA3</td>
<td>51</td>
<td>61</td>
<td>56</td>
<td>55</td>
</tr>
</tbody>
</table>

A number of non-residential land uses have been identified in the project area. The noise management levels applicable to other noise sensitive receivers such as educational facilities, places of worship and commercial receivers are listed in Table 6.6. These have been developed as recommended by the ICNG or derived from the internal levels presented in AS2107 as per guidance in ICNG. Hotels have been considered as a residential land use rather than a commercial land use. This provides a conservative assumption as the residential NML is more stringent than that which would be applied to a commercial receiver.

For traffic noise the criterion applied on public roads generated during the construction of a project is an increase in exiting road traffic noise of no more than 2dB(A).
Table 6.6 Noise management levels (NMLs)

<table>
<thead>
<tr>
<th>Land Use</th>
<th>NMLs (applies when properties are in use)</th>
<th>Land Use</th>
<th>NMLs (applies when properties are in use)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External noise level (dBA)</td>
<td>Commercial Premises (including offices, retail outlets)</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Internal noise level (dBA)</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Childcare Centre</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 (sleeping area)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medical</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Public building/Café/Bar/Restaurant</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Active recreational areas</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Passive recreational areas</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

Construction vibration criteria

The effects of vibration from construction works can be divided into three categories:

- Those in which the occupants of buildings are disturbed (human comfort)
- Those where building contents may be affected (building contents)
- Those where the integrity of the building may be compromised (structural or cosmetic damage).

Human comfort

Vibration from construction works can often be intermittent and the EPA’s Assessing Vibration: A Technical Guideline (2006) provides criteria for intermittent vibration based on the Vibration Dose Value (VDV). The ‘preferred’ and maximum VDVs for human comfort are shown in Table 6.7.

Table 6.7 Maximum preferred vibration does value

<table>
<thead>
<tr>
<th>Building type</th>
<th>Assessment period</th>
<th>Vibration dose value (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Working Areas (operating theatres or laboratories)</td>
<td>Day or night</td>
<td>0.1</td>
</tr>
<tr>
<td>Residential</td>
<td>Daytime</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Humans generally perceive vibration at levels well below those likely to cause damage to the contents of a building. Therefore it is generally not necessary to define criteria for vibration effects on building contents. An exception to this can occur where vibration sensitive equipment such as electron microscopes are located in buildings near construction works.

Structural or cosmetic damage

Currently there is no Australian Standard that provides guidance for assessing cosmetic building damage caused by vibration. However structural damage vibration limits are contained in British Standard BS7385 and German Standard DIN4150. BS7385 recommends vibration limits for transient vibration which will give minimal risk of vibration damage to affected buildings. While German Standard DIN4150 provides guideline limits for different buildings and buried pipework, damage is not expected to occur where values are complied with and the values are generally recognised to be conservative. Table 6.8 provides the DIN4150 guidelines for different structures and buried pipework.

Table 6.8 DIN4150 guideline values

<table>
<thead>
<tr>
<th>Type of structure/pipes</th>
<th>Vibration velocity (mm/s)</th>
<th>Plane of highest floor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at foundation at a frequency of</td>
<td>1 Hz to 10 Hz</td>
</tr>
<tr>
<td>Buildings used for commercial purposes, industrial buildings and buildings of similar design</td>
<td>20</td>
<td>20 to 40</td>
</tr>
<tr>
<td>Dwellings and buildings of similar design and/or use</td>
<td>5</td>
<td>5 to 15</td>
</tr>
<tr>
<td>Structures that because of their particular sensitivity to vibration (structurally unsound), do not correspond to those listed in Lines 1 or 2</td>
<td>3</td>
<td>3 to 8</td>
</tr>
<tr>
<td>Pipe – Steel, welded</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Pipe – Vitrified clay, concrete, reinforced concrete, prestressed concrete</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Masonry, plastics</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>
Rock breaking/hammering activities are considered to have the potential to cause dynamic loading in some structures (e.g. residences) and it is therefore appropriate to reduce the transient values by 50%.

For construction activities involving intermittent vibration sources such as rock breakers, piling rigs, vibratory rollers and excavators, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity) monitoring should be performed during construction.

**Heritage**

Heritage buildings are to be considered on a case by case basis. Dilapidation reports would be prepared for each heritage building. The standard states that “a building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive”.

Where a historic building is deemed to be sensitive to damage from vibration (following inspection), a more conservative superficial cosmetic damage criterion based on DIN 4150 would be applied.

### 6.3.2 Potential impacts

#### a) Construction phase

**Noise**

Ten work scenarios have been developed to assess potential impacts associated with the key construction activities likely required to construct the project. Source noise levels have been established for each of the scenarios using typical construction plant and equipment as outlined below in Table 6.9. It is anticipated that any of the activities could be undertaken during standard hours, evening or nighttime periods. These worst case scenarios have been modelled to determine predicted construction noise levels at representative receivers.
Table 6.9 Sound power level for specific activities

<table>
<thead>
<tr>
<th>Works Number</th>
<th>Scenario Name</th>
<th>Activity Name</th>
<th>Equipment</th>
<th>Items (in 15 min)</th>
<th>On-Time (15 min)</th>
<th>Individual SWL LAeq</th>
<th>Works SWL LAeq</th>
</tr>
</thead>
<tbody>
<tr>
<td>W.0001</td>
<td>Compound operations</td>
<td>Site preparation material Laydown</td>
<td>Mobile Crane – Franna</td>
<td>1</td>
<td>7.5</td>
<td>98</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hand tools (5mins)</td>
<td>1</td>
<td>5</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Generator</td>
<td>1</td>
<td>15</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Truck</td>
<td>1</td>
<td>5</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ute</td>
<td>1</td>
<td>15</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>W.0002</td>
<td>Vegetation removal</td>
<td>Tree and vegetation removal</td>
<td>Chainsaw</td>
<td>1</td>
<td>5</td>
<td>114</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Truck</td>
<td>1</td>
<td>5</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chipper</td>
<td>1</td>
<td>15</td>
<td>114</td>
<td></td>
</tr>
<tr>
<td>W.0003</td>
<td>Excavation, Trenching</td>
<td>High intensity with Rock breaker</td>
<td>Excavator (Breaker-small)</td>
<td>1</td>
<td>7.5</td>
<td>117</td>
<td>115</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Generator</td>
<td>1</td>
<td>15</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Truck</td>
<td>2</td>
<td>5</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lighting – Diesel Generator</td>
<td>1</td>
<td>15</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suction Truck</td>
<td>1</td>
<td>15</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>W.0004</td>
<td>Excavation, Trenching</td>
<td>Typical intensity without Rock breaker</td>
<td>Lighting – Diesel Generator</td>
<td>1</td>
<td>15</td>
<td>98</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Generator</td>
<td>1</td>
<td>15</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Excavator (10tonne)</td>
<td>1</td>
<td>7.5</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Truck</td>
<td>1</td>
<td>5</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Suction Truck</td>
<td>1</td>
<td>15</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>W.0005</td>
<td>Utility works including cable pull</td>
<td>High Intensity</td>
<td>Truck</td>
<td>1</td>
<td>5</td>
<td>107</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mobile crane – franna</td>
<td>1</td>
<td>7.5</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lighting – Diesel Generator</td>
<td>1</td>
<td>15</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hand tools (electric)</td>
<td>1</td>
<td>15</td>
<td>96</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Elevated Work Platform</td>
<td>1</td>
<td>15</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Hammer Drill</td>
<td>1</td>
<td>10</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rattle Gun</td>
<td>1</td>
<td>15</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>
To assess the potential noise impacts the proposal has been broken down into three sections of works:

- **Section 1** – Works along Chalmers Street to the Chalmers Street Entrance to Central Station
- **Section 2** – Works along Elizabeth Street, including Eddy Avenue
- **Section 3** – Works along Albion Street, Commonwealth Street and Ann Street.

A summary of the predicted noise levels (without mitigation) for the various work activities is presented below in Table 6.10 and Table 6.11 for residential, commercial and other sensitive receivers.

For most construction activities it is expected that the construction noise levels would be frequently lower than the predicted at the most exposed receiver as the noise levels presented in this report are based on a realistic worst case outcome.
### Table 6.10 Worst-Case Predicted noise levels at residential receivers

<table>
<thead>
<tr>
<th>NCA / Staging</th>
<th>Worst-Case Predicted $L_{Aeq(15\text{minute})}$ Noise Level (dBA)$^{1}$</th>
<th>Operating Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W.0001 – Compound Works</td>
<td>W.0002 – Vegetation Removal</td>
</tr>
<tr>
<td></td>
<td>D&amp;N</td>
<td>D&amp;N</td>
</tr>
<tr>
<td>Residential – Section 1</td>
<td>Works along Chalmers St</td>
<td></td>
</tr>
<tr>
<td>NCA 01</td>
<td>41</td>
<td>-</td>
</tr>
<tr>
<td>NCA 02</td>
<td>54</td>
<td>-</td>
</tr>
<tr>
<td>NCA 03</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Residential – Section 2</td>
<td>Works along Elizabeth St</td>
<td></td>
</tr>
<tr>
<td>NCA 01</td>
<td>61</td>
<td>61</td>
</tr>
<tr>
<td>NCA 02</td>
<td>55</td>
<td>64</td>
</tr>
<tr>
<td>NCA 03</td>
<td>44</td>
<td>53</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Residential – Section 3</td>
<td>Works along Albion St, Commonwealth St and Ann St</td>
<td></td>
</tr>
<tr>
<td>NCA 01</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NCA 02</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NCA 03</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Note 1: Shaded cells indicate predicted noise level exceedances of NML

### Table 6.11 Worst-Case Predicted noise levels at residential receivers (works W.0006 to W.0010)

<table>
<thead>
<tr>
<th>NCA / Staging</th>
<th>Worst-Case Predicted $L_{Aeq(15\text{minute})}$ Noise Level (dBA)$^{1}$</th>
<th>Operating Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W.0006 – Utility Works (Typical Intensity)</td>
<td>W.0007 – Underboring Activities (Typical Intensity)</td>
</tr>
<tr>
<td></td>
<td>D&amp;N</td>
<td>D&amp;N</td>
</tr>
<tr>
<td>Residential – Section 1</td>
<td>Works along Chalmers St</td>
<td></td>
</tr>
<tr>
<td>NCA 01</td>
<td>49</td>
<td>56</td>
</tr>
<tr>
<td>NCA 02</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>NCA 03</td>
<td>49</td>
<td>56</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Sleep disturbance

Noise from loud construction activities has the potential to cause sleep disturbance at the nearest residential receivers. As detailed in the ICNG, where construction works are proposed to occur over more than two consecutive nights a more detailed analysis is required.

Where possible, all noise intensive works should be restricted to daytime hours only to minimise any adverse effects on the surrounding residential receivers.

Where works are required to be undertaken during the night-time period, mitigation measures should be implemented, where practicable, as detailed below in Section 6.3 to minimise these exceedances.

Construction traffic

In order for construction traffic to generate an increase in noise levels of greater than 2 dB, existing traffic levels along construction traffic routes would need to increase by around 60 per cent.

Based on a Traffic and Transport Impact Assessment prepared by SLR (SLR, 2019), additional construction traffic movements would be expected to be one-off deliveries of plant or equipment with little requirements for haulage to occur. The traffic impacts arising from construction activities are expected to be minor and manageable. Therefore, the construction vehicles would have a minor impact on existing road traffic noise in the area. The traffic generated by the Proposal would be considered to comply with the Road Noise Policy criteria.

Eveleigh compound

Material laydown sites proposed for use include the Eveleigh Maintenance Centre, adjacent to the Macdonaldtown Stabling Yard. There are residential receivers surrounding this site, with the closest receiver located approximately 70 metres to the west. It is proposed that some heavy machinery such as trucks and cranes may be used at this location during night-time work.

The proposed laydown activities are expected to generate a sound power level of 106 dBA. The nearest residential receiver is approximately 70m away, the noise level is predicted to be approximately 61 dBA. Assuming the background noise levels are similar to that of receivers near Central Station and adjacent to the rail corridor, the NML is likely to be in the order of 50 dB. Therefore the closest residential receivers may experience noise levels up to 10 dB above the NML during the night-time period.

<table>
<thead>
<tr>
<th>Residential – Section 2</th>
<th>Works along Elizabeth St</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NCA 01</td>
<td>79</td>
<td>74</td>
<td>85</td>
<td>80</td>
<td>-</td>
</tr>
<tr>
<td>NCA 02</td>
<td>54</td>
<td>61</td>
<td>60</td>
<td>55</td>
<td>-</td>
</tr>
<tr>
<td>NCA 03</td>
<td>46</td>
<td>50</td>
<td>52</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residential – Section 3</th>
<th>Works along Albion St, Commonwealth St and Ann St</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NCA 01</td>
<td>80</td>
<td>-</td>
<td>86</td>
<td>81</td>
<td>-</td>
</tr>
<tr>
<td>NCA 02</td>
<td>46</td>
<td>-</td>
<td>52</td>
<td>47</td>
<td>-</td>
</tr>
<tr>
<td>NCA 03</td>
<td>44</td>
<td>-</td>
<td>50</td>
<td>45</td>
<td>-</td>
</tr>
<tr>
<td>NCA 04</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Note 1: Shaded cells indicate predicted noise level exceedances of NML
Vibration

During construction, vibration generating machinery would be required including, jackhammers, hammer drills and bored piling rigs. Construction activities that require the use of this machinery have the potential to create vibration which can disturb nearby sensitive receivers. As a guide safe working distances for the proposed items of vibration intensive plant are provided below in Table 6.11.

Table 6.12 Safe working distances for vibratory equipment

<table>
<thead>
<tr>
<th>Plant Item</th>
<th>Rating/description</th>
<th>Minimum distance</th>
<th>Human response (NSW EPA guideline)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cosmetic damage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Residential and light commercial</td>
<td>Group 2 (Typical Dwellings)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibratory roller</td>
<td>&lt; 50 kN (Typically 1-2t)</td>
<td>5 m</td>
<td>7 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 100 kN (Typically 2-4t)</td>
<td>6 m</td>
<td>8 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 200 kN (Typically 4-6t)</td>
<td>12 m</td>
<td>16 m</td>
</tr>
<tr>
<td></td>
<td>&lt; 300 kN (Typically 7-13t)</td>
<td>15 m</td>
<td>20 m</td>
</tr>
<tr>
<td></td>
<td>&gt; 300 kN (Typically 13-18t)</td>
<td>20 m</td>
<td>26 m</td>
</tr>
<tr>
<td></td>
<td>&gt; 300 kN (Typically &gt; 18t)</td>
<td>25 m</td>
<td>33 m</td>
</tr>
<tr>
<td>Small Hydraulic Hammer</td>
<td>300 kg - 5 to 12t excavator</td>
<td>2 m</td>
<td>3 m</td>
</tr>
<tr>
<td>Medium Hydraulic Hammer</td>
<td>900 kg - 12 to 18t excavator</td>
<td>7 m</td>
<td>10 m</td>
</tr>
<tr>
<td>Large Hydraulic Hammer</td>
<td>1600 kg - 18 to 34t excavator</td>
<td>22 m</td>
<td>29 m</td>
</tr>
<tr>
<td>Jackhammer</td>
<td>Hand held</td>
<td>1 m (nominal)</td>
<td>2 m</td>
</tr>
</tbody>
</table>
Cosmetic damage

For most sources of intermittent vibration during construction, such as rock breakers, the predominant vibration energy occurs at frequencies usually in the 10 Hz to 100 Hz range. On this basis, and with reference to BS7385:2 and Section 6.3.2, a vibration damage screening level of 7.5 mm/s has been adopted for the purpose of assessing potential impacts from continuous vibration.

The separation distance between the proposed works have the potential to exceed the 'cosmetic damage' when using a large rock breaker around Chalmers St Entrance as the nearest potentially sensitive structure is within one metre of the works location.

The distance to this structure along with deriving an appropriate criterion would be required to be determined prior to vibration intensive works being undertaken.

The assessment has not considered structures such as underground utilities which may be present in the project area and should be confirmed during detailed design.

Human comfort

In relation to human comfort (response), the safe working distances relate to continuous vibration and apply to residential receivers. The separation distance between the proposed works has the potential to exceed the ‘Human Response' criterion when using a large hydraulic hammer. This is anticipated to impact several residential properties surrounding the Albion St, Commonwealth St and Ann St works during rock breaking activities.

Heritage structures

Approximately half of the project zone is within minimum working distances to heritage listed structures (refer to Figure 6.4). This includes the following structures:

• Chalmers St Entrance and surrounding structures
• Eddy Ave Rail Road Overbridge
• Central Station Platforms and Station Houses
• Walls within the Rail Corridor, including:
  o Parapets
  o Retaining walls
  o Rail bridge structures
  o Foundations

Of these, the structure considered to be most sensitive to the works is the sandstone wall that extends from Chalmers St Entrance along Elizabeth Street.

Where coring activities are proposed to occur at the Chalmers Street Entrance sandstone wall vibration criterion cannot be established for these works, as these works involve coring through the wall itself and would result in exceedances of the vibration criterion.

The Proposal will also require rock breaking along sections of Elizabeth Street in close proximity to the heritage wall. Further assessment of the condition of the wall will be undertaken prior to work in this area. During vibration intensive activities occurring within close proximity, vibration monitoring would be undertaken in line with the appropriate criterion.
Figure 6.4 Cosmetic Damage and Human Comfort Vibration Screening with Heritage Overlay
Operational phase

The proposed feeder route is primarily underground or contained within GST along the rail corridor. The proposal is not expect to generate noise or vibration impacts with the operation of the Proposal are anticipated.

6.3.3 Mitigation measures

The following mitigation measures are proposed with respect to potential non-Indigenous heritage impacts:

- During detailed design, further investigation would be undertaken to identify the noise and vibration impacts on the nearest sensitive receivers. In accordance with TfNSW’s Construction Noise Strategy, and in consultation with impacted receivers, feasible and reasonable mitigation measures would be implemented to minimise impacts during construction.

- Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the Construction Noise and Vibration Strategy (TfNSW, 2018d) and the Noise and Vibration Impact Assessment (SLR, 2019) and in consultation with impacted receivers.

- The CNVMP would prescribe reasonable and feasible mitigation measures to minimise construction noise and vibration. The measures would focus on contractor inductions, selection and operation of plant and equipment, work scheduling (including respite periods), prescribing safe working distances for vibration intensive equipment, procedures for noise and vibration monitoring and obtaining approvals for out of standard hours works. The CNVMP would also detail requirements for managing potential vibration impacts to heritage structures through monitoring and safe working distances.

- The CNVMP would be supported by the Community Liaison Management Plan to be prepared for the Proposal, which would detail community notification requirements including distribution of notification flyers to stakeholders within a 300 metre radius of the Proposal area.

- Heritage buildings are to be considered on a case by case basis, and detailed inspections of heritage listed structures should be undertaken prior to any vibration intensive works being undertaken. It is proposed that rock breaking would be undertaken along sections of Elizabeth Street in close proximity to the sandstone retaining wall. It is also recommended that a structural engineer advise on the appropriate vibration thresholds of this and other nearby heritage structures to confirm the sensitivity to vibration.

- Where a historic building is deemed to be sensitive to damage from vibration (following inspection), it is proposed to reduce the vibration criteria. Where the building is confirmed to be more sensitive to vibration a more conservative superficial cosmetic damage criteria of 2.5 mm/s (based on DIN 4150) may be considered as a screening criterion. Where heritage buildings of a typical residential-type construction are not found to be structurally unsound, DIN 4150 superficial cosmetic damage criteria of 5 mm/s may be more suitable as a screening criterion.

Refer to Table 7.1 for a full list of proposed mitigation measures. All mitigation measures will be incorporated in the CEMP.
6.4 Indigenous heritage

6.4.1 Existing environment

A due diligence assessment was undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (OEH, 2010). A search of the Aboriginal Heritage Information Management System (AHIMS) database was undertaken for the Proposal area and surrounds on 19 February 2019, no recorded Aboriginal items were identified.

The OEH NSW Heritage database was also searched on 19 February 2019. No results were returned for Aboriginal places in the LGA of Sydney listed under the *National Parks and Wildlife Act 1974*.

There are no nearby landscape features (such as nearby waterways, sand dune systems, ridge tops, ridge lines, headlands, cliff faces and rock caves/shelters) that might indicate an increased potential for Indigenous objects. The Proposal occurs in a highly disturbed and modified environment both within the road and rail corridor, this suggests that the presence of culturally sensitive buried items is unlikely within the boundaries of the Proposal.

6.4.2 Potential impacts

a) Construction phase

A number of excavation works are required for the construction of the Proposal, this includes:

- underboring of Eddy Avenue
- trenching along the road corridor: Elizabeth Street, Albion Street, Commonwealth Street and Ann Street
- trenching within the footpath of Elizabeth Street
- excavation for civil pit within Chalmers Street entrance garden
- excavation for caisson shaft within the rail corridor

Given the desktop searches did not identify Indigenous heritage items in the Proposal area and the existing modified landscape, the likelihood of Indigenous heritage occurring at the proposal site is low. As such, the Proposal is unlikely to impact Indigenous heritage during construction.

a) Operational phase

Excavation work is not proposed during the operational phase of the Proposal, as a result impacts to Indigenous heritage are not anticipated.

6.4.3 Mitigation measures

The following mitigation measures are proposed with respect to potential Indigenous heritage impacts:

- 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 unidentified Indigenous objects are uncovered during construction, the procedures contained in the TfNSW Unexpected Heritage Finds Guideline
(TfNSW, 2015b) would be followed, and works within the vicinity of the find would cease immediately. The Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council.

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

Refer to Table 7.1 for a full list of proposed mitigation measures.
6.5 Non-Indigenous heritage

This section summarises the findings of the Statement of Heritage Impact (SoHI) prepared by GML Heritage to assess potential heritage impacts associated with the construction of the Proposal and is attached in Appendix E (GML Heritage, 2019). The research methodology used to undertake this assessment is provided in section 1.4 of the SoHI.

6.5.1 Assessment approach and methodology

The research methodology used to undertake this assessment is detailed in Section 1.4 of the SoHI. The assessment involved:

- identifying listed heritage items in the vicinity of the proposal site
- a site survey and inspection
- reviewing the proposal description
- Preparing a Statement of Heritage Impact in accordance with Statements of Heritage Impact (Heritage office and Department of Urban Affairs & Planning, 1996), Central Station Conservation Management Plan (Rappoport /NSW Government Architects Office 2013) and Assessing Heritage Significance (Heritage Office, 2001) and in accordance with the principles contained in The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance.

6.5.2 Existing environment

Historical background

The Proposal occurs within two historical areas – Central Station and Surry Hills. Central Station was constructed in the early 1900s, works would partially occur within the former Devonshire Street Cemetery site which is now largely within the Central Station precinct and adjoining Chalmers Street. The extent to which the Proposal occurs in the former Devonshire Street Cemetery site is shown in the SoHI.

Belmore Park is located adjacent to Central Station and is annexed by the rail viaduct. Historically Belmore Park was utilised throughout the nineteenth century as a produce market but also contained an open stormwater drain running from Elizabeth Street across the park towards Haymarket. The park was resumed in 1901 to facilitate construction of Central Station, this included the importation of large volumes of fill material.

The lands of Surry Hills were originally granted in the 1790s for farms and market gardens, which by the 1800s were developed into residential property. The area became known for light industry and clothing trade, post WWII the area gained a reputation for crime and vice. Since the 1980s Surry Hills has undergone gradual gentrification.

Listed heritage items

The Proposal partially occurs within the boundary of Central Railway Station. Database searches identified several listed heritage items in the area:

- Sydney Terminal and Central Railway Stations Group (State Heritage Register)
- Central Railway Station and Sydney Terminal Group (RailCorp s170 Register)
- Central Railway Station Group (Sydney Local Environmental Plan 2012).

The Sydney Terminal and Central Railway Stations Group is a state-significant item listed under the Heritage Act. The Proposal would cross the sandstone wall spanning from the Chalmers Street Entrance to the corner of Elizabeth Street and Eddy Avenue. As the Proposal
occurs within the mapped State heritage boundary, heritage provisions apply. The Central Railway Station and Sydney Terminal item is also listed on the RailCorp Heritage Register in accordance with s170 of the Heritage Act.

The Proposal route is adjacent to significant London Plane trees lining the Elizabeth Street footpath. These trees are listed on the City of Sydney Significant Tree Register and were planted in 1940 and younger replacements in the late 1970. These trees add to the visual and aesthetic quality of the streetscape and are considered to have local significance providing visual and historic value.

The following heritage items are also located in the vicinity of the project:

- Former ‘Railways Institute’ Building (Listed on the State Heritage Register and Sydney LEP)
- Seven London Plane Trees (Listed on the City of Sydney Significant Tree Register)
- Former Children’s Court Building Including Interior (Listed on the Sydney LEP)
- Former ‘William Booth Institute’ Including Interior (Listed on the Sydney LEP).

**Conservation Areas**

The Proposal traverses two Heritage Conservation Areas (HCAs) listed on the Sydney LEP 2012:

- Reservoir Street and Fosterville Heritage Conservation Area
- Albion Estate Heritage Conservation Area

The route crosses the Reservoir Street and Fosterville HCA on Commonwealth Street and Ann Street. Reservoir Street and Fosterville HCA is dominated by Crown Street Reservoir and provides good examples of mid to late Victorian terraces and Federation commercial buildings. The buildings date from a key period of development of Surry Hills and make a positive contribution to the streetscape.

The route also crosses the Albion Estate HCA on Albion Street. The Albion Estate represents several historical period layers for the development of Surry Hills as a result of the progressive subdivision. The former estate contains good examples of late Victorian terraces, twentieth century commercial buildings and hotels which make a positive contribution to the streetscape.

**Central Station Conservation Management Plan**

A Conservation Management Plan (CMP) has been prepared for Central Station (Rappoport Pty Ltd & NSW Government Architects’ Office, 2013). The Proposal occurs within two precincts of Central Station detailed in the CMP – Precinct 2 (Prince Alfred Siding) and Precinct 5 (Central Electric). The station is identified as a site/group that has high significance for its historical, aesthetic, technical values and its research potential. Specific elements of significance included within the plan are outlined below.

The site contains the original Sydney Railway Company grant on which the first Sydney Station and yards were opened, in 1855 and represent over 150 years of railway operations in the same place, making it the oldest and longest continuously operated rail yard in Australia.

The Sydney Terminal has high level of historic significance associated with its early government and institutional uses as well as being the site of Sydney’s second major burial ground, the Devonshire Street cemetery. The Central Station site contains evidence of the first phase of railway construction in NSW and has been the major hub of rail transportation in NSW since the mid-19th century. The Darling Harbour branch line and sandstone Ultimo Railway Overbridge is the oldest remaining piece of railway infrastructure in NSW.
Some of Sydney’s most notable 19th and 20th century architects and engineers have worked on the Central Station site. The main terminus building is accentuated by its clock tower and approach ramps which exemplifies the predominant use of sandstone at the site. The construction of the Sydney Terminus was the largest planned intervention into the urban fabric of Sydney at the time and it was the only major complex of the period where the urban setting was designed to enhance and provide views to and from the main structure.

Mortuary Station is a rare example by James Barnet of the Gothic Revival architectural style and is the only remaining example of a mortuary station in NSW. Elsewhere the exemplary architectural style of the Railway Institute is significant and it was the first institute of its type in Australia.

Prince Alfred sidings have historical associations with the development of the Sydney rail network and the first and second Sydney terminuses. It is the original site of the Sydney Terminal rail yards which commenced operation in 1855. Some of the oldest remaining workshops in the NSW railway system are located here.

The Central Electric Precinct documents the first phase of the suburban electrification of the NSW Railway in 1926. The Precinct has the grandest entrances of the City Circle, including the monumental sandstone walling of the Elizabeth Street Viaduct and the tram ramps.

Prince Alfred Substation was pivotal to the electrification of the City Circle line and is one of three substations in Sydney designed by Dr John Bradfield.

The Chalmers Street Entrance documents the first phase of suburban electrification of the NSW Railway. It demonstrates aesthetic significance in its Neo-classical architectural features. The adjacent garden provides open space and enhances the setting of the entrance.

**Archaeological potential**

The study area was divided into three zones to reflect the stages of historical development within the Proposal route (Figure 6.5).

The zones are associated with the following phases of historical development:

- **Zone 1 – roadways**
  - Phase 1: Outskirts of Sydney (c1800–c1840)
  - Phase 2: Roadways (c1840–1878)
  - Phase 3: Tram Line (1878–1960)
  - Phase 4: Modern Roads (1961–Present)

- **Zone 1 – Belmore Park**
  - Phase 1: Crown Land and Police Paddocks (c1800–c1850)
  - Phase 2: Produce Markets (c1851–1867)
  - Phase 3: Public Park (1868–1900)
  - Phase 4: Construction Central Railway Station (1901–1906)
  - Phase 5: City of Sydney Care (1907–Present)

- **Zone 2**
  - Phase 1: Devonshire Street Cemetery (1820–1901)
  - Phase 2: Establishment of Central Railway Station (1901–1920)
  - Phase 3: Central Electric (1920–Present)

- **Zone 3**
Phase 1: Government Paddocks (1820–1850)
Phase 2: First Sydney Terminus Rail Yards (1850–1870)
Phase 3: Second Sydney Terminus (1870–1901)
Phase 4: Central Station (1901–Present).

Figure 6.5 Three distinct zones of historical development within the study area delineated with proposed feeder route marked in red (GML, 2019)

Each zone has been assessed for archaeological potential and significance, a summary is provided Table 6.12. It is noted that areas of the Central Electric Precinct were assessed as having no remnant archaeological potential due to the construction of underground rail and submerged tracks. An excavation permit (140) or exception (139) under the Heritage Act are not required for the Proposal.

Nearby works at both Sydney Light Rail and Sydney Metro have uncovered human remains associated with the former Devonshire Street Cemetery and surrounds. Finds were located at the corner of Randall and Chalmers Street and the corner of Elizabeth and Chalmers Street. Sydney Metro uncovered a coffin within a vault beneath Platform 13.
Table 6.13 Summary of possible archaeological remains by zones, potential and significance

<table>
<thead>
<tr>
<th>Zone</th>
<th>Possible archaeological remains</th>
<th>Potential</th>
<th>Significance</th>
</tr>
</thead>
</table>
| Surry Hills Roadways | Phase 1 (c1800–c1840) | • isolated artefacts resulting from loss or discard  
• small single-use rubbish pits | Low          | Local        |
|      | Phase 2 (c1840–1878) | • former kerbing  
• drains (brick, stone, ceramic)  
• early road surfaces and bases (macadam, Telford and/or woodblock surfaces)  
• structural remains indicating the alignment of the street | Low–moderate | Local (Not Relics) |
|      | Phase 3 (1878–1960) | • former kerbing  
• drains and services (brick, ceramic, metal, plastic)  
• road surfaces (concrete, asphalt)  
• metal tracks and wooden sleepers associated with the tram line that formerly extended along Elizabeth Street | High         | Local (Not Relics) |
| Belmore Park | Phase 1 (c1800-c1850) | • isolated artefacts  
• rubbish pits | Low          | Local        |
|      | Phase 2 (c1850-1867) | • informal fence lines  
• open stormwater and other drains  
• early path surfaces and bases  
• isolated artefacts resulting from loss or discard  
• small, single-use rubbish pits | Low          | Local        |
|      | Phase 3 (1868-1900) | • evidence of original layout and landscaping of original park  
• stormwater and other drains  
• tram tracks and sleepers | Low-moderate | Local        |
|      | Phase 4 (1901-1906) | • imported fill deposits  
• isolated items of rail infrastructure | Moderate     | Local (not relics) |
<table>
<thead>
<tr>
<th>Zone</th>
<th>Possible archaeological remains</th>
<th>Potential</th>
<th>Significance</th>
</tr>
</thead>
</table>
| Zone 1 Devonshire Street Cemetery Phase 2 (1850–1870) | • the c1860 sandstone Goods Store  
• structural remains of produce and goods sheds (timber, stone or brick)  
• drains and services (brick, metal, ceramic)  
• rail infrastructure | Low–moderate | Local                 |
| Zone 2 Devonshire Street Cemetery Phase 3 (1870–1901) | • structural remains of outbuildings  
• rail infrastructure  
• drains and services (brick, metal, ceramic) | Low–moderate | Local                 |
| Zone 3 Rail Yards Phase 1 (1820–1855) | • post holes delineating fence lines and paddocks  
• garden beds and edging  
• isolated artefacts resulting from loss or discard  
• small single-use rubbish pits | Low         | Local                 |
| Zone 2 Devonshire Street Cemetery Phase 1 (1820–1901) | • grave cuts  
• human skeletal remains  
• grave goods and personal items  
• caskets and coffin furniture  
• headstones and grave edging  
• vaults and other memorial structures | Low–moderate | State                 |
| Zone 3 Rail Yards Phase 2 (1850–1870) | • sandstone, trachyte or concrete kerbs  
• drains and services (brick, ceramic, metal, plastic)  
• road and path surfaces and bases | Low         | None                  |
6.5.3 Potential impacts

a) Construction phase

Temporary impacts to heritage areas and adjacent heritage items are associated with trenching works in the roadways and footpath however these areas would be reinstated following completion of works. Construction plant, equipment and fencing would have a temporary visual impact on the setting of conservation areas and adjacent heritage items.

Boring through the underground footing of the sandstone retaining wall would result in a localised moderate adverse impact to heritage fabric however this would not be visible from the public domain. The Proposal has the potential to impact significant trees listed of the Sydney Council Significant Tree Register. Adverse impacts to trees during the construction of the Proposal would be managed through mitigation measures provided in Table 7.1. There is potential for significant archaeology associated with former Devonshire Street Cemetery to be impacted by works within the Chalmers Street entrance garden. Potential archaeology is estimated to be located from approximately 1.2 m below ground level. Adverse impacts would be managed through mitigation measures provided in Table 7.1. If human remains are encountered during construction additional approvals including an Exhumation Policy would be required.

The installation of GST would not have a notable visual impact occurring adjacent to existing rail infrastructure and pre-existing GST routes. Trenching from Elizabeth Street through to Ann Street would not result in permanent impacts to the heritage significance of conservation areas as works are confined to below ground level.

Overall the proposal would have a neutral impact on the heritage significance of Central station.

b) Operational phase

Ground-disturbance works or impact to heritage fabric would not be required during the operational phase of the Proposal. As such, impacts to non-Indigenous heritage are not anticipated.

6.5.4 Mitigation measures

The following mitigation measures are proposed with respect to potential non-Indigenous heritage impacts:

- The CMP advises that new services are to be installed in a manner that causes the least damage to building fabric and should be reversible if possible. It is recommended to seek an alternative method for installing the required cabling, for example connecting the cables through an existing access point, through a door frame or through an internal wall.

- Remediation of the areas following completion of the works would mitigate any temporary visual impacts.

- The temporary visual impacts on Belmore Park as an item would be mitigated with reinstatement of the landscape following completion of the works. Belmore Park itself would be unaffected.

- The garden and landscape elements should be restored following completion of works.

- Physical barriers must be used to protect the dwarf wall from potential damage as machinery is brought into and moves around the site during works.
• Sydney Trains should be consulted regarding the reinstatement of the Chalmers Street entrance park on completion of works. The reinstatement should be undertaken in accordance with their requirements and conditions of the Section 60 approval.

• Archaeological remains, if present, should be investigated and recorded in accordance with the archaeological work method statement (section 8) and conditions of the Section 60 approval prior to removal.

• The CMP recommends that all new service installations should be easily identifiable as new work, and where possible should be reversible and dated. The proposed GST installation within the rail corridor should follow this recommendation.

• Vibration monitoring should be undertaken during the works. This should be set to appropriate allowances for sandstone heritage structures.

• The NDD and excavation work should be monitored by an archaeologist with experience identifying human remains. If archaeological remains are suspected or identified, works must cease in the affected area to allow for assessment and appropriate mitigation in accordance with the method statement in Section 8 and the Section 60 approval.

• If human remains are identified, the NSW Police and the Heritage Division must be notified. Redesign to avoid impact should be considered. Impacts, such as removal, can only be undertaken in accordance with an endorsed Exhumation Policy and any further heritage approvals required.

Refer to Table 7.1 for a full list of proposed mitigation measures.

6.6 Socio-economic impacts

6.6.1 Existing environment

The Proposal occurs within the central business district of Sydney. Surrounding land use of the Proposal site comprises of mixed use, infrastructure, residential, public recreation and metropolitan centre zones. Central Station precinct itself is a major multi-level transport interchange between pedestrians, vehicular traffic, trains, rail, light rail, and bus services. Recent statistics released by Transport Performance and Analytics (TPA) (formally known as Bureau of Transport Statistics) estimate around 234,000 entries and exits at Central Station occur on a typical day (TPA, 2018).

Sensitive receivers in proximity of the Proposal include:

• residential receivers along Albion Street, Commonwealth Street and Ann Street
• a number of commercial and retail spaces associated with the Central Station precinct
• commercial and retail spaces at Railway Square including short-stay hostels
• dentistry School/medical clinic and library south-east of the Chalmers Street entrance
• cafes, food outlets and convenience stores on Chalmers Street
• entertainment facilities and performing arts space along Randle Street
• places of Worship including the Chinese Presbyterian Church and the St Sophia Greek Orthodox Parish in Surry Hills

A review of the 2016 Australian Bureau of Statistics (ABS) Census data was undertaken for the suburbs of Surry Hills and Haymarket in which the Proposal occurs. The suburb of Surry Hills has a population of 16,412 people with a median age of 34 years. 42.1 per cent of the people living in Surry Hills were born in Australia and 71.2 percent of the people who reported
being in the labour force were in full time employment. The most common method of travel to work for employed people was by public transport (35.4 per cent).

The suburb of Haymarket has a population of 7,353 with a median age of 27. The most common country of birth in Haymarket was Thailand at 20.7 per cent, with 8.3 per cent of residents born in Australia. In terms of employment, 50.6 per cent of people work part-time and 35.2 per cent of people work full-time. The most common method of travel to work was by public transport (43.6 per cent).

6.6.2 Potential impacts

a) Construction phase

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

- temporary changes to vehicular, bus, bicycle and pedestrian access to, through and movements around the station
- temporary changes to pedestrian footpaths – Elizabeth Street, Albion Street, Commonwealth Street and Ann Street
- temporary changes to pedestrian/cyclist shared paths – Chalmers Street to Eddy Avenue and Elizabeth Street
- temporary changes to the local road network – partial or full road closures of Eddy Avenue, Elizabeth Street, Albion Street, Commonwealth Street and Ann Street
- temporary impact to public vehicle parking on Albion Street, Commonwealth Street and Ann Street
- temporary impact to building access along Albion Street, Commonwealth and Ann Street
- increased truck movements delivering materials and equipment and transporting waste
- construction noise, vibration, dust and visual impacts.

Neighbouring construction activities for Sydney Light Rail and Sydney Metro have impacted the businesses of the Proposal area through changes in access, connectivity and disruptions to utilities. Cumulative impacts of neighbouring projects are discussed in Section 6.11.

b) Operational phase

The operation of the new feeder would not impact on existing land use being within the rail corridor and would be installed underground within road corridor towards Surry Hills substation.

The Proposal would have a positive socio-economic benefit to the Sydney LGA by meeting the power supply needs of Sydney Trains and future Sydney Metro, allowing Central Station to continue to operate as a major transport hub.

6.6.3 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. These measures include:

- a Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and the best practice methods for consultation with these groups during construction. The Plan would also encourage feedback and facilitate
opportunities for the community and stakeholders to have input into the project, where practicable

- contact details for a 24-hour construction response line (1800 775 465), Project Infoline (1800 684 490) and email address (projects@transport.nsw.gov.au) 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 Plan to be developed prior to construction.

Refer to Sections 6.1, 6.2 and 6.3 for discussion on the potential traffic/access, visual and acoustic amenity impacts arising from the Proposal and the proposed management strategies. Refer to Table 7.1 for a full list of proposed mitigation measures. All mitigation measures would be incorporated into the CEMP.

6.7  Biodiversity

This section includes a summary of the Arboricultural Impact Assessment prepared by Earthscape Horticultural Services and is attached in Appendix G (Earthscape Horticultural Services, 2019). The methodologies used to undertake this assessment is provided in Appendix G.

6.7.1  Existing environment

The Proposal occurs within a highly modified environment both within the rail and road corridors. The vegetation outside the rail corridor is limited to trees within the Chalmers Street entrance garden, trees and shrubs on the median strip of Elizabeth Street and street trees along Albion Street, Commonwealth Street, and Ann Street. Species of trees along the Proposal route include non-local native and exotic species including:

- *Olea europaea subsp. europaea* (European Olive)
- *Phoenix sylvestris* (Silver Date Palm)
- *Platanus orientalis* (Oriental Plane)
- *Melaleuca quinquenervia* (Broad-leaved Paperbark)
- *Pistacia chinensis* (Chinese Pistachio)

Database search

A desktop database search was undertaken on 21 February 2019 to identify potential species, populations and ecological communities of conservation significance within the study area and Proposal site. The Commonwealth DoEE Protected Matters Search Tool for relevant matters of national environmental significance listed under the EPBC Act within 1 km of the Proposal site (DoEE, 2019). The search identified five listed threatened Ecological Communities, 57 listed threatened species and 58 migratory species with the potential to occur in the Proposal area.

Threatened species or communities

A field survey conducted as part of the Arborist Assessment did not identify any threatened or vulnerable species at the Proposal site, none of the subject trees form part of Endangered Ecological Communities (EECs) under the BC Act or the EPBC Act.

Wildlife habitat

Trees were assessed for signs of wildlife habitation such as hollows, however no such trees were identified. All trees however would be of some benefit to native wildlife.
6.7.2 Potential impacts

a) Construction phase

The Proposal would require the removal of three trees of low retention value (Trees T60, T61 and T62 (European Olive)). In addition three trees of moderate to high retention value (T57 (Illawarra Flame Tree), T58 (Silver Date Palm) and T63 (Oriental Plane Tree)) may require removal, subject to further investigation during trenching works.

The Proposal may have a moderate impact on 59 trees adjacent to proposed trenches. However the assessment concludes that provided a range of mitigation measures are implemented these trees would be retained.

Ten trees in the vicinity of the Proposal would require canopy pruning. The assessment concludes that this pruning is unlikely to affect the overall health of the trees.

b) Operational phase

Excavation or impact to trees would not be required during the operational phase of the Proposal. As such, impacts to ecology is not anticipated.

6.7.3 Mitigation measures

- A Tree Protection Plan would be implemented for the Proposal. The Tree Protection Plan would be developed from the Arboricultural Impact Assessment and would include the location of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained.
- Tree protection fencing would be installed for trees to be retained as identified in the Arboricultural Impact Assessment.
- Trunk protection boarding would be erected around trees identified in the Arboricultural Impact Assessment to prevent accidental damage.
- Excavation adjacent to trees nominated for retention will be undertaken under the supervision of a qualified Arborist.
- Canopy pruning of Trees shall be carried out in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon.
- Where trees are required to be removed new trees shall be planted elsewhere in accordance with the TfNSW Vegetation Offset Guideline (2017).
- Replacement trees would be selected in consultation with the relevant property owners and would be in accordance with City of Sydney Council’s Street Tree Master Plan 2011.

Refer to Table 7.1 for a full list of proposed mitigation measures.

6.8 Contamination, landform, geology and soils

A geotechnical desktop assessment and contamination assessment was undertaken as part of the REF. A waste analysis and classification report were also prepared based on several samples collected from Central Station in February 2019 (ADE Consulting Group, 2019). The findings are summarised in this section.
6.8.1 Existing environment

Landform, geology and soils

The 1:100,000 Geological Map of Sydney indicates that the geology underlying the Proposal is Hawkesbury sandstone of the Wianamatta Group which comprises medium to coarse grained quartz sandstone with very minor shale and landscape lenses. The 1:100,000 Sydney Soil Landscape Series indicates the Proposal traverses two soil landscapes:

- Blacktown: shallow to moderately deep (<100 cm), Red and Brown Podzolic Soils on crests, upper slopes and well-drained areas deep (150-300 cm) Yellow Podzolic Soils and Soloths on lower slopes and in areas of poor drainage.
- Lucas heights: moderately deep (50-150 cm), hardsetting Yellow Podzolic Soils and Yellow Soloths and Yellow Earths on outer edges.

Acid sulfate soils

The Botany Bay Acid Sulfate Soil Risk Map – Edition Two (Department of Land and Water Conservation [DLWC], 1997) was reviewed to assess the potential for acid sulfate soils (ASS) at the Proposal site. The map indicated the area contained ‘No Known Occurrence’ in regards to ASS risk. Additionally no observations (staining, odour) were noted during field works in February 2019 that were indicative of ASS.

Contamination

A search of the public register of notices issues by the NSW EPA under the CLM Act was undertaken on 18 February 2019 within the City of Sydney LGA. The search revealed no reported contaminated sites in the vicinity of the Proposal. The nearest listed contaminated site notified to the EPA is a service station approximately 700 m east of the Proposal on Oxford Street, Paddington.

The Prince Alfred Substation building identified as a potential site office may involve the modifications to internal walls as described in section 3. The building has previously been identified as containing asbestos, lead paint and lead dust (GHD, 2015).

Historic activities associated with rail corridors that have the potential to result in contamination include the introduction of fill materials including ash, fuel or oil spills and accidental leaks or spills from maintenance and operational activities.

The waste analysis and classification report provides a summary of laboratory soil testing undertaken which assessed the presence of the following (ADE Consulting Group, 2019):

- heavy metals – arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc (M8);
- Total recoverable hydrocarbons (TRH);
- Polycyclic aromatic hydrocarbons (PAHs);
- Toxicity characteristic leaching procedure (TCLP) – benzo(a)pyrene (B[a]P);
- Benzene, toluene, ethyl-benzene and xylene (BTEX);
- Polychlorinated biphenyl (PCBs);
- Organochlorine pesticides (OCPs);
- Organophosphorous pesticides (OPPs); and
- asbestos.

The waste analysis and classification report concluded that:
the concentrations of M8, TRHs, BTEX, PCBs, PAHs, TCLP – BaP, OCPs, and OPPs in the soil materials collected from the subject area meet the NSW EPA criteria assigned for General Solid Waste (GSW)

- the soil materials are to be classified as ‘non-putrescible’
- asbestos was not observed within the subject material or detected within any of the soil samples collected
- paint chips, sulfidic ores and hydrocarbon odours / staining were not observed within any of the materials inspected

The waste analysis and classification report has been used as reference only and cannot be used to assume all potential contaminants within the Proposal site at Central Station. The mitigation measures proposed are considered adequate to avoid any contamination impacts during the construction phase of the Proposal.

### 6.8.2 Potential impacts

#### a) Construction phase

The Proposal would involve a number of ground-disturbance works including potholing or Non-Destructive Digging (NDD) to locate underground services and/or utilities, trenching along the footpath and roads, underboring pits and civil pits and the installation of free-standing GST posts.

**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 through the stormwater infrastructure.

The Proposal has the potential to disturb asbestos containing material and other hazardous substances (such as lead paint) from the changes proposed to the Prince Alfred Substation building identified as a potential site office. Appropriate mitigation measures would be implemented to manage hazardous substances during demolition works. This would include the removal of hazardous materials from the structure by appropriately licensed asbestos/hazardous waste removalists. There is also potential for construction activities to result in the contamination of soil through accidental fuel or chemical spills from construction plant and equipment.

**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.

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

These impacts are considered to be minor due to the limited level of ground disturbance required for the Proposal and the relatively flat topography and stability of the Proposal area. Erosion risks can be adequately managed through the implementation of standard measures as outlined in *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) (the Blue Book).
b) Operational phase

There would be no operational risks to geology or soils as a result of the Proposal.

6.8.3 Mitigation measures

As part of the CEMP, a site-specific Erosion and Sediment Control Plan would be prepared and implemented in accordance with the Blue Book. The Erosion and Sediment Control Plan would be established prior to the commencement of construction and be updated and managed according to the activities occurring during construction.

An environmental risk assessment is to be undertaken prior to construction and must include a section on contamination as per the TfNSW Standard Requirements. Measures to mitigate potential impacts from contaminated soil/materials identified during construction would be developed and implemented through an unexpected contamination finds procedure and Waste Management Plan as part of the CEMP. All waste would be managed in accordance with relevant legislation.

As there is potential for onsite contamination given historic activities associated with the railway land use, prior to construction commencing, a contamination investigation would be undertaken by a suitable qualified professional to confirm the composition and nature of excavated material. Where spoil is classified as unsuitable for reuse it would be transferred to an appropriately licensed offsite waste disposal facility.

The handling, storage, transport and disposal of all asbestos and hazardous waste (including lead waste) would be in accordance with the requirements of the PoEO Act, WARR Act and relevant guidelines. Impacts and mitigation measures for waste management are discussed in Section 6.11.1.

Refer to Table 7.1 for a full list of proposed mitigation measures.

6.9 Hydrology and water quality

6.9.1 Existing environment

The Proposal occurs within the wider Sydney Harbour Catchment area which borders Warringah to the north, Blacktown to the west, Sydney Harbour National Park to the east and Marrickville to the south. There are no waterways in the direct vicinity of the Proposal. Nearest waterway to the Proposal is Rushcutters Creek approximately 1.7 km north east of the Proposal. The Proposal does not occur within a flood prone area.

The Proposal largely occurs within paved areas with existing drainage infrastructure. Rail corridor drainage and station precinct runoff generally discharges locally to closed Council drainage lines.

a) Construction phase

Without appropriate safeguards, pollutants (fuel, chemicals or wastewater from accidental spills and sediment from excavations and stockpiles) could potentially reach nearby stormwater drains and flow into waterways. Activities which would disturb soil during construction work also have the potential to impact on 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. Appropriate controls would be detailed in the CEMP and established to ensure the drainage points are adequately protected during construction activities.
Moderate to heavy wet weather events may cause localised flooding which could increase the potential for soil erosion and sedimentation impacts on stormwater. Where required, dewatering activities would be undertaken in accordance with the Blue Book and managed in line with the TfNSW Water Discharge and Reuse Guideline (TfNSW, 2017d). If required, dewatering volumes are unlikely to be significant (generally less than one megalitre), and an aquifer interference licence would not be required.

b) Operational phase
There are no requirements to undertake ground disturbance works during the operational phase of the Proposal, as such no operational risks to hydrology and water quality are anticipated.

6.9.2 Mitigation measures

- an Erosion and Sediment Control Plan would be prepared and implemented in accordance with the requirements of the Blue Book (Managing Urban Stormwater: Soils and Construction – Landcom, 2004) for the Proposal to manage risks to water quality.
- spill kits would be available on site and included on environmental control maps (ECMs), and training in spill response procedures would form part of the site inductions provided for construction staff
- dewatering (if required) would be undertaken in accordance with TfNSW’s Water Discharge and Reuse Guideline (TfNSW, 2017d)

Refer to Table 7.1 for a full list of proposed mitigation measures.

6.10 Air quality

6.10.1 Existing environment

The broader Sydney East monitoring region provides the most representative air quality monitoring results for Sydney. The Sydney East region includes air quality monitoring sites at Macquarie Park, Chullora, Rozelle, Lindfield, Randwick and Earlwood. The closest monitoring site to the Proposal is Rozelle however this site is noted as non-conforming to the requirements of Australian Standard AS/NZS 3580.

A search of the daily regional air quality index for the Sydney East region for last year (March 2018 to March 2019) showed that the region experienced:

- very good air quality on 3.5 per cent of days
- good air quality on 64.1 per cent of days
- fair air quality on 22.1 per cent of days
- poor air quality on 5.2 per cent of days
- very poor air quality on 2.1 per cent of days
- hazardous air quality on 2.7 per cent of days.

The Proposal occurs in a highly urbanised environment, the main contributor to air quality surrounding the Proposal is emissions from motor vehicles on the surrounding road network. Sensitive receivers in the vicinity of the Proposal include staff and customers at Central Station, commercial properties around the Station and residential properties in Surry Hills.
6.10.2 Potential impacts

a) Construction phase
Temporary air quality impacts that have the potential to occur during construction include minor increases in dust and emissions of carbon monoxide, sulphur dioxide, particulate matter, nitrous oxides, volatile organic compounds and other substances associated with excavation and the combustion of diesel fuel and petrol from construction plant and equipment.

Anticipated sources of dust and dust-generating activities include:

- potholing and geotechnical investigation works
- trenching and excavation for footpath works, temporary bore pits, cabling pits, relocation of services
- stockpiling activities
- loading and transfer of material from trucks
- other general construction activities

The Proposal would have a temporary minor impact on air quality during ground disturbance works. The operation of plant, machinery and trucks, as well as construction traffic, may also lead to increases in exhaust emissions in the local area however these impacts would be minor and short-term. Any adverse air quality impacts would be appropriately managed using the mitigation measures detailed in Table 7.1.

b) Operational phase
Overall impacts on air quality during the operation of the Proposal would be negligible as the Proposal would not result in a change in land use.

Additionally, as the Proposal would increase access to public transport, the use of public transport would be expected to increase and lead to a relative reduction in the amount of private vehicle related emissions in the long-term.

6.10.3 Mitigation measures
The following mitigation measures are proposed with respect to potential air quality impacts:

- Air quality management and monitoring for the Proposal would be undertaken in accordance with the TfNSW Air Quality Management Guideline (TfNSW, 2018a).
- 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 Table 7.1 for a full list of proposed mitigation measures.

### 6.11 Other impacts

#### 6.11.1 Services/utilities

The Proposal has the potential to impact services such as from direct impact from excavation activities or from operation of other equipment, if services are not appropriately identified and protected or relocated. A DBYD search identified a number of utilities in the vicinity of the proposed works including:

- telecommunication services
- stormwater services
- high pressure gas mains
- water and sewer services
- rail utilities, e.g. drainage.

The detailed design of the Proposal would be undertaken to avoid services where feasible. Relocation or other works that may affect services would be undertaken in consultation with the respective utility authorities.

#### 6.11.2 Waste

**Construction**

The construction of the Proposal would generate a range of waste streams including:

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

Appropriate planning of construction activities would ensure that the volume of surplus materials is minimised. Waste management would be undertaken in accordance with the **Waste Avoidance and Resource Recovery Act 2001 (WARR Act)**. 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.

The handling, storage, transport and disposal of asbestos and hazardous waste (including lead waste) would be in accordance with the requirements of relevant EPA and Safe Work NSW guidelines.
Waste management targets in consideration of the TfNSW *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017c) would be developed for the Proposal and would include reuse and recycling and completion of the .

**Operation**

The Proposal would not result in changes to operational waste management arrangements.

**Mitigation measures**

The following mitigation measures are proposed with respect to potential waste impacts:

- 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.

Refer to Table 7.1 for a full list of proposed mitigation measures.

### 6.12 Cumulative impacts

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.

#### 6.12.1 Existing environment

A search of the Department of Planning and Environment’s Major Projects Register on 21 February 2019 identified two major projects in the immediate vicinity of the Proposal:

- Sydney Metro City & Southwest - Chatswood to Sydenham
- Sydney Light Rail CBD and South East Light Rail Project Application

These projects would run concurrently with the construction phase of the Proposal. Other developments likely to occur within the locality would be small scale projects such as residential dwellings in adjacent residential areas.

During construction, the works would be coordinated with any other construction activities in the area, including Sydney Light Rail and Sydney Metro. Consultation and liaison would occur with City of Sydney Council, Sydney Trains, and any other developers identified, to minimise cumulative construction impacts such as traffic and noise.

Traffic associated with the construction work is not anticipated to have a significant impact on the surrounding road network. Operational traffic and transport impacts would have a minimal impact on the performance of the surrounding road network.
Based on this assessment, it is anticipated that the cumulative impacts would be minor, provided that consultation with relevant stakeholders and mitigation measures in Chapter 7 are implemented.

6.12.2 Mitigation measures

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.

Refer to Table 7.1 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 the TfNSW Greenhouse Gas Inventory Guide for Construction Projects (TfNSW, 2013). 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 the construction of the Proposal would be negligible. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures detailed in Table 7.1.

The operation of the proposed feeder would release of greenhouse gas emissions associated with the generation of additional power from Chalmers Street Substation to supply the Sydney Trains and Sydney Metro network. The generation of greenhouse gas emissions are also associated with combustion of fuel in plant and equipment if repair to above-ground GST is required. There are no maintenance requirements associated with the feeder during its 50 year design life. Overall, greenhouse gas emissions associated with the operational-phase of the proposal are considered to be negligible.

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 flood event would occur more frequently.

As a climate risk assessment was not undertaken during the concept design, no climate change risks have been identified for mitigation.

In addition, the impact of rainfall events and flooding have not been addressed in the assessment. The Proposal is not located on land that is susceptible to flooding. The closest mapped flood prone land is approximately 1.5 km away near Rushcutters Creek in Paddington.
Climate change could lead to an increase in frequency and severity in bushfires. The Proposal is not situated on land mapped as bush fire prone.

### 6.13.3 Sustainability

The design of the Proposal would be based on the principles of sustainability, including the incorporation of the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017c) and the TfNSW *Environmental Management System* (EMS). These guidelines require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.1.4 for more information regarding the application of these guidelines.

Further positive impacts in relation to climate change and sustainability associated with the Proposal include encouraging a reduction in private vehicle use and increase the frequency and capacity of public transport services.
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

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A Construction Environmental Management Plan (CEMP) would be prepared by the Contractor in accordance with the relevant requirements of Guideline for Preparation of Environmental Management Plans, 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.</td>
</tr>
<tr>
<td>2.</td>
<td>A project risk assessment including environmental aspects and impacts would be undertaken by the Contractor prior to the commencement of construction and documented as part of the CEMP.</td>
</tr>
<tr>
<td>3.</td>
<td>An Environmental Controls Map (ECM) would be developed by the Contractor in accordance with TfNSW's Guide to Environmental Controls Map (TfNSW, 2015a) for approval by TfNSW, prior to the commencement of construction and following any revisions made throughout construction.</td>
</tr>
<tr>
<td>4.</td>
<td>Prior to the commencement of construction, all contractors would be inducted on the key project environmental risks, procedures, mitigation measures and conditions of approval.</td>
</tr>
<tr>
<td>5.</td>
<td>Site inspections to monitor environmental compliance and performance would be undertaken during construction at appropriate intervals.</td>
</tr>
<tr>
<td>6.</td>
<td>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.</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------</td>
</tr>
<tr>
<td>7.</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Traffic and site access**

<table>
<thead>
<tr>
<th>8.</th>
<th>Prior to the commencement of construction, a Traffic Management Plan (TMP) would be prepared as part of the CEMP and would include at a minimum:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• the construction approach and staging measures to minimise extent of work areas</td>
</tr>
<tr>
<td></td>
<td>• details of construction traffic demands and routes required including construction compound access and egress</td>
</tr>
<tr>
<td></td>
<td>• ensuring adequate road signage at construction work sites to inform motorists and pedestrians of the work site ahead to ensure that the risk of road accidents and disruption to surrounding land uses is minimised</td>
</tr>
<tr>
<td></td>
<td>• maximising safety and accessibility for pedestrians and cyclists</td>
</tr>
<tr>
<td></td>
<td>• ensuring adequate sight lines to allow for safe entry and exit from the site</td>
</tr>
<tr>
<td></td>
<td>• ensuring access to railway stations, businesses, entertainment premises and residential properties (unless affected property owners have been consulted and appropriate alternative arrangements made)</td>
</tr>
<tr>
<td></td>
<td>• managing impacts and changes to on and off street parking and requirements for any temporary replacement provision</td>
</tr>
<tr>
<td></td>
<td>• parking locations for construction workers away from stations and busy residential areas and details of how this will be monitored for compliance</td>
</tr>
<tr>
<td></td>
<td>• routes to be used by heavy construction-related vehicles to minimise impacts on sensitive land uses and businesses</td>
</tr>
<tr>
<td></td>
<td>• details for relocating kiss and ride, taxi ranks and rail replacement bus stops if required, including appropriate signage to direct patrons, in consultation with the relevant bus/taxi operators. Particular provisions would also be considered for the accessibility impaired</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td>Consultation with the relevant roads authorities would be undertaken during preparation of the construction TMP. The performance of all project traffic arrangements must be monitored during construction.</td>
</tr>
</tbody>
</table>

| 9.  | 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. |

| 10. | Road Occupancy Licences for temporary road closures would be obtained, where required. |

**Urban design, landscape and visual amenity**

<table>
<thead>
<tr>
<th>11.</th>
<th>Worksite compounds would be screened with shade cloth (or similar material, where necessary) to minimise visual impacts from key viewing locations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Temporary hoardings, barriers, traffic management and signage would be removed when no longer required.</td>
</tr>
<tr>
<td>13.</td>
<td>During construction, graffiti would be removed in accordance with TfNSW’s Standard Requirements.</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------</td>
</tr>
<tr>
<td>14.</td>
<td>Light spill from the construction area into adjacent visually sensitive properties would be minimised by directing construction lighting into the construction areas and ensuring the site is not over-lit. This includes the sensitive placement and specification of lighting to minimise any potential increase in light pollution.</td>
</tr>
<tr>
<td>15.</td>
<td>Prior to commencement of works, a Construction Noise and Vibration Management Plan (CNVMP) would be prepared and implemented in accordance with the requirements of the <em>Interim Construction Noise Guideline</em> (Department of Environment and Climate Change, 2009), <em>Construction Noise Strategy</em> (TfNSW, 2018d) and the Noise and Vibration Impact Assessment for the Proposal (SLR Consulting, 2019). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable.</td>
</tr>
</tbody>
</table>
| 16. | The CNVMP would outline measures to reduce the noise impact from construction activities. Reasonable and feasible noise mitigation measures which would be considered, include:  
- regularly training workers and contractors (such as at the site induction and toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise  
- avoiding any unnecessary noise when carrying out manual operations and when operating plant  
- ensuring spoil is placed and not dropped into awaiting trucks  
- avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where practicable  
- switching off any equipment not in use for extended periods e.g. heavy vehicles engines would be switched off whilst being unloaded  
- avoiding deliveries at night/evenings where practicable  
- no idling of delivery trucks  
- keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site  
- minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite; no dropping of materials from height where practicable, no throwing of metal items and slamming of doors. |
| 17. | The CNVMP would include measures to reduce the construction noise and vibration impacts from mechanical activities. Reasonable and feasible noise mitigation options which would be considered, include:  
- maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances  
- using the most suitable equipment necessary for the construction works at any one time  
- directing noise-emitting plant away from sensitive receivers  
- regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc  
- using non-tonal reversing/movement alarms such as broadband (non-tonal) alarms or ambient noise-sensing alarms for all plant used regularly onsite (greater than one day), and for any out of hours works  
- use of quieter and less vibration emitting construction methods where feasible and reasonable. |
No. Mitigation measure

Works would generally be carried out during standard construction hours (i.e. 7.00 am to 6.00 pm Monday to Friday; 8.00 am to 1.00 pm Saturdays). Any works outside these hours may be undertaken if approved by TfNSW and the community is notified prior to these works commencing. An Out of Hours Work application form would need to be prepared by the Contractor and submitted to the TfNSW Environment and Planning Manager for any works outside normal hours.

19. Where the LAeq (15minute) construction noise levels are predicted to exceed 75 dBA and/or 30 dBA above the Rating Background Level at nearby affected sensitive receivers, respite periods would be observed, where practicable, and in accordance with TfNSW’s Construction Noise Strategy (TfNSW, 2018d). This would include restricting the hours that very noisy activities can occur.

20. To avoid structural impacts as a result of vibration or direct contact with structures, the proposed works would be undertaken in accordance with the safe work distances outlined in the Noise and Vibration Assessment (SLR Consulting, 2019) and attended vibration monitoring or vibration trials would be undertaken where these distances are required to be challenged.

21. Vibration resulting from construction and received at any structure outside of the project would be managed in accordance with:


22. Property conditions surveys would be completed prior to piling, excavation of bulk fill or any vibratory works including jack hammering and compaction for all buildings/structures/roads with a plan distance of 50 metres from the works and all heritage listed buildings and other sensitive structures within 150 metres of the works (unless otherwise determined following additional assessment they are not likely to be adversely affected).

23. Heritage buildings are to be considered on a case by case basis, and detailed inspections of heritage listed structures should be undertaken prior to any vibration intensive works being undertaken. It is proposed that rock breaking would be undertaken along sections of Elizabeth Street in close proximity to the sandstone retaining wall. It is also recommended that a structural engineer advise on the appropriate vibration thresholds of this and other nearby heritage structures to confirm the sensitivity to vibration.

Indigenous heritage

24. 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.
<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>25.</td>
<td>If unforeseen Indigenous objects are uncovered during construction, the procedures contained in TfNSW’s <em>Unexpected Heritage Finds Guideline</em> (TfNSW, 2015b) would be followed, and works within the vicinity of the find would cease immediately. The Contractor would immediately notify the TfNSW Project Manager and TfNSW Environment and Planning Manager so they can assist in co-ordinating next steps which are likely to involve consultation with an Aboriginal heritage consultant, the OEH and the Local Aboriginal Land Council. If human remains are found, work would cease, the site secured and the NSW Police and the OEH notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained prior to works recommencing at the location.</td>
</tr>
<tr>
<td>26.</td>
<td>A section 60 approval under the <em>Heritage Act 1977</em> would be obtained from the NSW Heritage Council (or delegate) prior to the commencement of construction and the conditions of the approval must be implemented.</td>
</tr>
<tr>
<td>27.</td>
<td>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.</td>
</tr>
<tr>
<td>28.</td>
<td>In the event that any unanticipated archaeological deposits are identified within the project site during construction, the procedures contained in TfNSW’s <em>Unexpected Heritage Finds Guideline</em> (TfNSW, 2015b) would be followed, and works within the vicinity of the find would cease immediately. The 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 OEH. Where required, further archaeological work and/or consents would be obtained for any unanticipated archaeological deposits prior to works recommencing at the location.</td>
</tr>
<tr>
<td>29.</td>
<td>The CMP advises that new services are to be installed in a manner that causes the least damage to building fabric and should be reversible if possible. It is recommended to seek an alternative method for installing the required cabling, for example connecting the cables through an existing access point, through a door frame or through an internal wall.</td>
</tr>
<tr>
<td>30.</td>
<td>Remediation of the areas following completion of the works would mitigate any temporary visual impacts.</td>
</tr>
<tr>
<td>31.</td>
<td>Use of the space adjacent to the Chalmers Substation as a temporary laydown area is not anticipated to have any heritage impact on Central Station.</td>
</tr>
<tr>
<td>32.</td>
<td>Use of the road and carpark area south of the Chalmers Substation for vehicle access is not anticipated to have any heritage impact on the remnant workshops at the southern end of the Prince Alfred Sidings Precinct.</td>
</tr>
<tr>
<td>33.</td>
<td>The temporary visual impacts on Belmore Park as an item would be mitigated with reinstatement of the landscape following completion of the works. Belmore Park itself would be unaffected.</td>
</tr>
<tr>
<td>34.</td>
<td>The garden and landscape elements should be restored following completion of works.</td>
</tr>
<tr>
<td>35.</td>
<td>Physical barriers must be used to protect the dwarf wall from potential damage as machinery is brought into and moves around the site during works.</td>
</tr>
<tr>
<td>36.</td>
<td>Advice from an arborist should be sought and any trimming should be minimised. Removal should be avoided.</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
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</tr>
<tr>
<td>37.</td>
<td>Machinery movement within the grassed area should be minimised. Track mats and other protective measures should be used.</td>
</tr>
<tr>
<td>38.</td>
<td>If removal of the Silver Date Palm is unavoidable, a replacement should be replanted following completion of the works and remediation of the garden.</td>
</tr>
<tr>
<td>39.</td>
<td>Sydney Trains should be consulted regarding the reinstatement of the Chalmers Street entrance park on completion of works. The reinstatement should be undertaken in accordance with their requirements and conditions of the Section 60 approval.</td>
</tr>
<tr>
<td>40.</td>
<td>In accordance with the CMP policy for this area, excavation in this location should be monitored by an archaeologist to confirm the assessment.</td>
</tr>
<tr>
<td>41.</td>
<td>Archaeological remains, if present, should be investigated and recorded in accordance with the archaeological work method statement (section 8) and conditions of the Section 60 approval prior to removal.</td>
</tr>
<tr>
<td>42.</td>
<td>Care should be taken not to inadvertently damage the mural on the east side of the boundary wall.</td>
</tr>
<tr>
<td>43.</td>
<td>Attach brackets to existing non-heritage structures along the rail corridor where possible.</td>
</tr>
<tr>
<td>44.</td>
<td>The CMP recommends that all new service installations should be easily identifiable as new work, and where possible should be reversible and dated. The proposed GST installation within the rail corridor should follow this recommendation.</td>
</tr>
<tr>
<td>45.</td>
<td>Use smaller capacity rock breakers during excavation to minimise potential for indirect impact to the heritage wall from vibration.</td>
</tr>
<tr>
<td>46.</td>
<td>Vibration monitoring should be undertaken during the works. This should be set to appropriate allowances for sandstone heritage structures.</td>
</tr>
<tr>
<td>47.</td>
<td>NDD is required to locate services. However, this should be undertaken with caution and in a controlled manner.</td>
</tr>
<tr>
<td>48.</td>
<td>Excavation should be undertaken carefully using a small excavator with a flat bucket.</td>
</tr>
<tr>
<td>49.</td>
<td>The NDD and excavation work should be monitored by an archaeologist with experience identifying human remains. If archaeological remains are suspected or identified, works must cease in the affected area to allow for assessment and appropriate mitigation in accordance with the method statement in Section 8 and the Section 60 approval.</td>
</tr>
<tr>
<td>50.</td>
<td>NDD work should be undertaken with caution. A combination of NDD and hand excavation should be used to locate services prior to the main pit excavation. Hand excavation should be used where possible for depths below 1 metre and where it is unclear if the investigation area is within fill.</td>
</tr>
<tr>
<td>51.</td>
<td>If human remains are identified, the NSW Police and the Heritage Division must be notified. Redesign to avoid impact should be considered. Impacts, such as removal, can only be undertaken in accordance with an endorsed Exhumation Policy and any further heritage approvals required.</td>
</tr>
<tr>
<td>52.</td>
<td>Undertake structural checks plus potential additional monitoring, and temporary protection of the heritage wall so that no unintentional damage is caused.</td>
</tr>
<tr>
<td>53.</td>
<td>Reinstate the original landscape of the park to visually cover the impact to the wall.</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
</tr>
<tr>
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</tr>
<tr>
<td>54.</td>
<td>The proposed path of trenching would take the route that would have the least impact on the significant trees. Removal of trees would be avoided where possible.</td>
</tr>
<tr>
<td>55.</td>
<td>Advice from an arborist regarding acceptable impacts to root systems and canopies should be sought. NDD may be preferable for excavation around root systems.</td>
</tr>
<tr>
<td>56.</td>
<td>Consultation with the City of Sydney should be undertaken if impacts to the significant trees are proposed.</td>
</tr>
<tr>
<td>57.</td>
<td>The temporary visual impacts on Belmore Park as an item would be mitigated with reinstatement of the landscape following completion of the works.</td>
</tr>
<tr>
<td>58.</td>
<td>Remediation of the landscape would resolve any minor impact on views around Eddy Avenue/Elizabeth Street.</td>
</tr>
<tr>
<td>59.</td>
<td>The geotechnical boreholes should be undertaken with caution and monitored by an archaeologist. The borehole logs should be inspected for evidence of intact soil deposits (sands) and any evidence of human skeletal remains. The boring must cease if human skeletal remains are suspected.</td>
</tr>
<tr>
<td>60.</td>
<td>Excavation adjacent to the viaduct (outsider SHR curtilage) should be monitored. If archaeological remains are suspected or identified, works must cease in the affected area to allow for assessment and appropriate mitigation in accordance with the method statement in Section 8.</td>
</tr>
<tr>
<td>61.</td>
<td>Visual impacts would be resolved with remediation of the road and footpath following conclusion of the work.</td>
</tr>
</tbody>
</table>

**Socio-economic**

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>62.</td>
<td>Sustainability criteria for the Proposal would be established to encourage the Contractor to purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal.</td>
</tr>
<tr>
<td>63.</td>
<td>Feedback through the submissions process would be encouraged to facilitate opportunities for the community and stakeholders to have input into the project, where practicable.</td>
</tr>
<tr>
<td>64.</td>
<td>A Community Liaison Plan would be prepared prior to construction to identify all potential stakeholders and best practice methods for consultation with these groups during construction. The plan would also encourage feedback and facilitate opportunities for the community and stakeholders to have input into the project, where practicable.</td>
</tr>
<tr>
<td>65.</td>
<td>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.</td>
</tr>
<tr>
<td>66.</td>
<td>The community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan to be developed prior to construction.</td>
</tr>
</tbody>
</table>

**Biodiversity**

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>67.</td>
<td>Construction of the Proposal must be undertaken in accordance with TfNSW’s <em>Vegetation Management (Protection and Removal) Guideline</em> (TfNSW, 2015d) and TfNSW’s <em>Fauna Management Guideline</em> (TfNSW, 2018e).</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
</tr>
<tr>
<td>-----</td>
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</tr>
<tr>
<td>68.</td>
<td>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.</td>
</tr>
<tr>
<td>69.</td>
<td>Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. Trees nominated to be removed in the Arborist Assessment (Earthscape Horticultural Services, 2019) 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.</td>
</tr>
<tr>
<td>70.</td>
<td>Tree Protection Zones (TPZs) would be established around trees to be retained, as nominated in the Arborist Assessment (Earthscape Horticultural Services, 2019). Tree protection would be undertaken in line with <em>AS 4970-2009 Protection of Trees on Development Sites</em> and would include exclusion fencing of TPZs.</td>
</tr>
<tr>
<td>71.</td>
<td>In the event of any tree to be retained becoming damaged during construction, the 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.</td>
</tr>
<tr>
<td>72.</td>
<td>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, the Contractor would be required to complete TfNSW's Tree Removal Application Form and submit it to TfNSW for approval.</td>
</tr>
<tr>
<td>73.</td>
<td>For new landscaping works, mulching and watering would be undertaken until plants are established.</td>
</tr>
<tr>
<td>74.</td>
<td>Weed control measures, consistent with TfNSW’s <em>Weed Management and Disposal Guideline</em> (TfNSW, 2015c), 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 <em>Noxious Weeds Act 1993</em>.</td>
</tr>
<tr>
<td>75.</td>
<td>Offsets and/or landscaping would be undertaken in accordance with TfNSW’s <em>Vegetation Offset Guide</em> (TfNSW, 2016) and in consultation with the relevant council, and/or the owner of the land upon which the vegetation is to be planted.</td>
</tr>
</tbody>
</table>
76. A Tree Protection Plan would be implemented for the Proposal. The Tree Protection Plan would be developed from the Arboricultural Impact Assessment and would include the location of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained. Reasonable and feasible aboricultural mitigation measure would be considered including:

- Tree protection fencing would be installed for trees to be retained as identified in the Arboricultural Impact Assessment.
- Trunk protection boarding would be erected around trees identified in the Arboricultural Impact Assessment to prevent accidental damage.
- Excavation adjacent to trees nominated for retention will be undertaken under the supervision of a qualified Arborist.
- Canopy pruning of Trees shall be carried out in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon.
- Where trees are required to be removed new trees shall be planted elsewhere within the relevant road reserves in accordance with the TfNSW Vegetation Offset Guideline (2016).
- Replacement trees would be selected in consultation with the relevant property owners and would be in accordance with City of Sydney Council’s Street Tree Master Plan 2011.

Soils and water

77. 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.

78. 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.

79. 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.

80. 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, 2018b).

81. Adequate 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, 2018b) 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.

82. In the event of a pollution incident, works would cease in the immediate vicinity and the 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.
<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.</td>
<td>The existing drainage systems would remain operational throughout the construction phase.</td>
</tr>
<tr>
<td>84.</td>
<td>Should groundwater be encountered during excavation works, groundwater would be managed in accordance with the requirements of the <em>Waste Classification Guidelines</em> (EPA, 2014) and TfNSW's <em>Water Discharge and Reuse Guideline</em> (TfNSW, 2017d).</td>
</tr>
<tr>
<td>85.</td>
<td>Should stormwater be required to be removed during excavation works, stormwater should be managed in accordance with the requirements of TfNSW’s <em>Water Discharge and Reuse Guideline</em> (TfNSW, 2017d).</td>
</tr>
</tbody>
</table>

### Air quality

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>86.</td>
<td>Air quality management and monitoring for the Proposal would be undertaken in accordance with TfNSW’s <em>Air Quality Management Guideline</em> (TfNSW, 2018a).</td>
</tr>
<tr>
<td>87.</td>
<td>Methods for management of emissions would be incorporated into project inductions, training and pre-start/toolbox talks.</td>
</tr>
<tr>
<td>88.</td>
<td>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.</td>
</tr>
<tr>
<td>89.</td>
<td>Vehicle and machinery movements during construction would be restricted to designated areas and sealed/compacted surfaces where practicable.</td>
</tr>
<tr>
<td>90.</td>
<td>To minimise the generation of dust from construction activities, the following measures would be implemented:</td>
</tr>
<tr>
<td></td>
<td>• apply water (or alternate measures) to exposed surfaces (e.g. unpaved roads, stockpiles, hardstand areas and other exposed surfaces)</td>
</tr>
<tr>
<td></td>
<td>• cover stockpiles when not in use</td>
</tr>
<tr>
<td></td>
<td>• 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</td>
</tr>
<tr>
<td></td>
<td>• prevent mud and dirt being tracked onto sealed road surfaces.</td>
</tr>
</tbody>
</table>

### Waste and contamination

<table>
<thead>
<tr>
<th>No.</th>
<th>Mitigation measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>91.</td>
<td>The CEMP (or separate Waste Management Plan, if necessary) must address waste management and would at a minimum:</td>
</tr>
<tr>
<td></td>
<td>• 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</td>
</tr>
<tr>
<td></td>
<td>• detail other onsite management practices such as keeping areas free of rubbish</td>
</tr>
<tr>
<td></td>
<td>• specify controls and containment procedures for hazardous waste and asbestos waste</td>
</tr>
<tr>
<td></td>
<td>• outline the reporting regime for collating construction waste data.</td>
</tr>
<tr>
<td>92.</td>
<td>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.</td>
</tr>
<tr>
<td>93.</td>
<td>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.</td>
</tr>
<tr>
<td>No.</td>
<td>Mitigation measure</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------</td>
</tr>
<tr>
<td>94.</td>
<td>All spoil and waste must be classified in accordance with the <em>Waste Classification Guidelines Part 1: Classifying waste</em> (EPA, 2014) prior to disposal.</td>
</tr>
<tr>
<td>95.</td>
<td>Any concrete washout would be established and maintained in accordance with TfNSW’s <em>Concrete Washout Guideline</em> – draft (TfNSW, 2018c) with details included in the CEMP and location marked on the ECM.</td>
</tr>
</tbody>
</table>

**Climate change and sustainability**

| 96. | Detailed design of the Proposal would be undertaken in accordance with the *NSW Sustainable Design Guidelines – Version 4.0* (TfNSW, 2017c). |

**Cumulative impacts**

| 97. | 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.

Key drivers of the proposal included future infrastructure works, the full deployment of NIF and SGT Fleets as well as the integration of Sydney Metro. These projects place increasing pressure on the existing electrical infrastructure network.

The assessment concluded that the Proposal objectives were in line with the Central Station Conservation Management Plan in promoting the continued use of Central Station as a major transport hub. Overall the works would have a neutral impact on the heritage significance of the Station.

The Proposal would provide the following benefits:

- improve service reliability by reducing the risk of disruption to rail services
- provide power for the future integration of NIF and Sydney Metro network

The likely key impacts of the Proposal are as follows:

- temporary impacts to the local pedestrian services and walking routes, cycle routes, public vehicle routes, public vehicle parking and building access during construction
- temporary cumulative construction noise impacts to sensitive receivers during construction
- potential impact to trees within the Chalmers street entrance garden
- potential impact to street trees along the footpath of Elizabeth Street, Albion Street, Commonwealth Street and Ann Street
- if the Prince Alfred Substation building option is utilised as a site office there is the potential to disturb asbestos containing material and other hazardous substances (such as lead paint)

This REF has considered and assessed these impacts in accordance with the requirements of the EPBC Act and the clause 228 of the EP&A Regulation (refer to Chapter 6, Appendix B and Appendix C). Based on the assessment contained in this REF, it is considered that the Proposal is not likely to have 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.
References


AGIC, 2011, *Guidelines for Climate Change Adaptation*, Australian Green Infrastructure Council (now Infrastructure Sustainability Council of Australia), Sydney


Department of Environment, Climate Change and Water, 2011, *NSW Road Noise Policy*, Sydney


GHD, 2015, *Chalmers Street Substation Review of Environmental Factors*, Sydney


OEH, 2010, *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW South Wales*, Sydney


TfNSW, 2015a, *Guide to Environmental Control Map*, Sydney

TfNSW, 2015b, *Unexpected Heritage Finds Guideline*, Sydney

TfNSW, 2016a, *Unexpected Heritage Finds Guideline*, Sydney
TfNSW, 2016b, *Vegetation Offset Calculator*, Sydney
TfNSW, 2016c, *Vegetation Offset Guide*, Sydney
TfNSW, 2017b, *Guide to Environmental Controls Map*, Sydney
TfNSW, 2017c, *NSW Sustainable Design Guidelines - Version 4.0*, Sydney
TfNSW, 2017d, *Water Discharge and Reuse Guideline*, Sydney
TfNSW, 2018a, *Air Quality Management Guideline*, Sydney
TfNSW, 2018b, *Chemical Storage and Spill Response Guidelines*, Sydney
TfNSW, 2018c, *Concrete Washout Guideline - draft*, Sydney
TfNSW, 2018d, *Construction Noise and Vibration Strategy*, Sydney
TfNSW, 2018e, *Fauna Management Guideline*, Sydney
TfNSW, 2018f, *Future Transport 2056*, TfNSW, Sydney
TfNSW, 2018g, *Vegetation Management (Protection and Removal) Guideline*, Sydney
TPA, 2018, Transport Performance and Analytics website
Appendix A

Consideration of matters of National Environmental Significance

The table below demonstrates TfNSW’s consideration of the matters of NES under the EPBC Act to be considered in order to determine whether the Proposal should be referred to Commonwealth Department of the Environment.

<table>
<thead>
<tr>
<th>Matters of NES</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any impact on a World Heritage property?</td>
<td>Nil</td>
</tr>
<tr>
<td>There are no World Heritage Properties in the vicinity of the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Any impact on a National Heritage place?</td>
<td>Nil</td>
</tr>
<tr>
<td>There are no National Heritage places in the vicinity of the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Any impact on a wetland of international importance?</td>
<td>Nil</td>
</tr>
<tr>
<td>There are no wetlands of international importance in the vicinity of the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Any impact on a listed threatened species or communities?</td>
<td>Nil</td>
</tr>
<tr>
<td>Listed threatened species or communities would not be impacted by the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Any impacts on listed migratory species?</td>
<td>Nil</td>
</tr>
<tr>
<td>It is unlikely that the development of the Proposal would significantly affect any listed migratory species.</td>
<td></td>
</tr>
<tr>
<td>Does the Proposal involve a nuclear action (including uranium mining)?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal does not involve a nuclear action.</td>
<td></td>
</tr>
<tr>
<td>Any impact on a Commonwealth marine area?</td>
<td>Nil</td>
</tr>
<tr>
<td>There are no Commonwealth marine areas in the vicinity of the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal is for a transport facility and does not relate to coal seam gas or mining.</td>
<td></td>
</tr>
<tr>
<td>Additionally, any impact (direct or indirect) on Commonwealth land?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal does not occur on Commonwealth land.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B  Consideration of clause 228

The table below demonstrates TfNSW’s consideration of the specific factors of clause 228 of the EP&A Regulation in determining whether the Proposal would have a significant impact on the environment.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Any environmental impact on a community?</td>
<td>Minor</td>
</tr>
<tr>
<td>There would be some temporary impacts to the community during construction, particularly in relation to noise, traffic, access and visual amenity. Mitigation measures outlined in Section 7.2 would be implemented to manage and minimise adverse impacts.</td>
<td></td>
</tr>
<tr>
<td>(b) Any transformation of a locality?</td>
<td>Moderate</td>
</tr>
<tr>
<td>The proposal may remove up to three trees in the Chalmers Street entrance garden and may impact on up to six street trees on Elizabeth Street, Albion Street, Commonwealth Street and Ann Street. This would have a moderate visual impact on the landscape character of the aforementioned streets.</td>
<td></td>
</tr>
<tr>
<td>(c) Any environmental impact on the ecosystem of the locality?</td>
<td>Minor</td>
</tr>
<tr>
<td>The Proposal would require the removal of up to 6 trees; however this vegetation does not form part of any threatened ecological communities, or is likely to provide habitat for threatened species and so would have a negligible impact to the ecosystem. The extent of vegetation trimming and removal has been minimised as far as practicable. Any additional trees that are found to require removal, not assessed in this REF, would be subject to further assessment, offsetting and approval from TfNSW.</td>
<td></td>
</tr>
<tr>
<td>(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?</td>
<td>Minor</td>
</tr>
<tr>
<td>There would be some temporary impacts during construction particularly in relation to noise, traffic and access and visual amenity. The removal of vegetation would also result in a visual change however this would be managed via offsetting.</td>
<td></td>
</tr>
<tr>
<td>(e) Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?</td>
<td>Minor</td>
</tr>
<tr>
<td>The Proposal would have a positive contribution to the locality by supporting the future power demands of the Sydney Trains network and allowing Central Station to continue to operate as a major transport hub. The assessment concluded that the Proposal would have a neutral impact on the heritage value of the area.</td>
<td></td>
</tr>
<tr>
<td>(f) Any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974)?</td>
<td>Minor</td>
</tr>
<tr>
<td>The Proposal is unlikely to have any impact on the habitat of protected fauna.</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Impacts</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>(g) Any endangering of any species of animal, plant or other form of</td>
<td>Nil</td>
</tr>
<tr>
<td>life, whether living on land, in water or in the air?</td>
<td></td>
</tr>
<tr>
<td>The Proposal is unlikely to have any impact on endangering any species</td>
<td></td>
</tr>
<tr>
<td>of animal, plant or other form of like, whether living on land, in</td>
<td></td>
</tr>
<tr>
<td>water or in the air.</td>
<td></td>
</tr>
<tr>
<td>(h) Any long-term effects on the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal is unlikely to have any long-term effects on the</td>
<td></td>
</tr>
<tr>
<td>environment.</td>
<td></td>
</tr>
<tr>
<td>(i) Any degradation of the quality of the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal is unlikely to have any degradation of the quality of</td>
<td></td>
</tr>
<tr>
<td>the environment.</td>
<td></td>
</tr>
<tr>
<td>(j) Any risk to the safety of the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>Provided the recommended mitigation measures are implemented, the</td>
<td></td>
</tr>
<tr>
<td>Proposal is unlikely to cause any pollution or safety risks to the</td>
<td></td>
</tr>
<tr>
<td>environment. Specific management measures would be implemented to</td>
<td></td>
</tr>
<tr>
<td>manage asbestos and other hazardous materials that may be</td>
<td></td>
</tr>
<tr>
<td>encountered during construction works.</td>
<td></td>
</tr>
<tr>
<td>(k) Any reduction in the range of beneficial uses of the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal is unlikely to have any reduction in the range of</td>
<td></td>
</tr>
<tr>
<td>beneficial uses of the environment.</td>
<td></td>
</tr>
<tr>
<td>(l) Any pollution of the environment?</td>
<td>Nil</td>
</tr>
<tr>
<td>The Proposal is unlikely to cause any pollution of the environment</td>
<td></td>
</tr>
<tr>
<td>provided the recommended mitigation measures are implemented.</td>
<td></td>
</tr>
<tr>
<td>(m) Any environmental problems associated with the disposal of</td>
<td>Nil</td>
</tr>
<tr>
<td>waste?</td>
<td></td>
</tr>
<tr>
<td>The Proposal is unlikely to cause any environmental problems</td>
<td></td>
</tr>
<tr>
<td>associated with the disposal of waste.</td>
<td></td>
</tr>
<tr>
<td>Hazardous waste and special waste may be generated from the Proposal.</td>
<td></td>
</tr>
<tr>
<td>Prior to construction, contamination investigations would be</td>
<td></td>
</tr>
<tr>
<td>undertaken to confirm the presence of contaminated material,</td>
<td></td>
</tr>
<tr>
<td>particularly asbestos. All waste would be managed and disposed of</td>
<td></td>
</tr>
<tr>
<td>with a site-specific Waste Management Plan prepared as part of the</td>
<td></td>
</tr>
<tr>
<td>Construction Environmental Management Plan. Mitigation measures would</td>
<td></td>
</tr>
<tr>
<td>be implemented to ensure waste is reduced, reused or recycled where</td>
<td></td>
</tr>
<tr>
<td>practicable.</td>
<td></td>
</tr>
<tr>
<td>(n) Any increased demands on resources (natural or otherwise) that</td>
<td>Nil</td>
</tr>
<tr>
<td>are, or are likely to become, in short supply?</td>
<td></td>
</tr>
<tr>
<td>The Proposal is unlikely to increase demands on resources that are,</td>
<td></td>
</tr>
<tr>
<td>or are likely to become, in short supply.</td>
<td></td>
</tr>
<tr>
<td>(o) Any cumulative environmental effect with other existing or likely</td>
<td>Nil</td>
</tr>
<tr>
<td>future activities?</td>
<td></td>
</tr>
<tr>
<td>Cumulative effects of the Proposal are described in Section 6.12.</td>
<td></td>
</tr>
<tr>
<td>Where feasible, project activities and environmental management</td>
<td></td>
</tr>
<tr>
<td>measures would be co-ordinated to reduce any cumulative construction</td>
<td></td>
</tr>
<tr>
<td>impacts. The Proposal is unlikely to have any significant adverse</td>
<td></td>
</tr>
<tr>
<td>long-term impacts.</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td>Impacts</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?</td>
<td>Nil</td>
</tr>
</tbody>
</table>

The Proposal is unlikely to impact on coastal processes and coastal hazards, including those under projected climate change conditions.
## Appendix C Sustainable Design Guidelines checklist

### Compulsory initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Theme</th>
<th>Description</th>
<th>Design (D) or Construct (C) interface</th>
<th>Under consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CERT</td>
<td>Energy and greenhouse gases</td>
<td>All projects with a CapEx &gt; $15 million to reduce construction related GHG emissions by a minimum 5% from the project baseline GHG footprint established using the Carbon Estimate and Reporting Tool (CERT).</td>
<td>DC</td>
<td>No Under $10M</td>
</tr>
</tbody>
</table>
| 2 Energy efficient buildings | Energy and greenhouse gases | Buildings are required to be designed and built to reduce energy consumption:  
- Covered or uncovered areas shall meet pre-requisite requirements for services (Appendix F, Section 3).  
- Enclosed building spaces shall meet the performance targets of the energy modelling pathway (P2-P5).  
- Where enclosed building space cost < $10 million the prescriptive pathway may be followed in lieu of energy modelling (P1). | DC                                   | No No buildings proposed |
<p>| 2A Electrical equipment | Energy and greenhouse gases | All new electrical equipment (for the final asset) to be at least market average star rating. In categories where no star ratings are available, equipment purchased should be recognised as high efficiency either by being ENERGY STAR accredited, in a high efficiency band under Australian Standards or being above-average efficiency of Greenhouse and Energy Minimum Standards (GEMS) registered products. | DC                                   | No                  |
| 3 CRA      | Climate resilience            | All projects with a CapEx &gt;$15 million to undertake a climate risk assessment that mitigates all extreme and high residual risks. Refer to I&amp;S Climate Risk Assessment Guide for further guidance.                                                        | DC                                   | No                  |
| 4 Landfill diversion | Materials and waste | 90% of construction waste and demolition waste (by weight) to be diverted from landfill for all projects with a CapEx &gt; $15 million.                                                                                                               | DC                                   | No                  |</p>
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Theme</th>
<th>Description</th>
<th>Design (D) or Construct (C) interface</th>
<th>Under consideration</th>
</tr>
</thead>
</table>
| 5          | Spoil reuse                  | The aim of this requirement is to reduce resource consumption and waste generation in the design and construction of projects. Projects should consider:  
• Balancing site works to avoid excess or importation of spoil.  
• Reuse any excess usable spoil on site (e.g. – landform feature, visual screening, noise attenuation).  
• Reuse any excess usable spoil off site (e.g. – at a nearby development where the spoil meets use requirements). | D C No                             |                     |
<p>| 6          | impervious area treatment    | All new effective impervious area with a continuous area &gt;1000m² to be treated through water sensitive urban design.                                                                                     | D C No                             |                     |
| 7          | Water consumption            | All projects with a CapEx &gt; $15 million to monitor and report water consumption during project construction and reduce potable water consumption where practicable.                                 | D C No                             |                     |
| 8          | Water balance study          | All projects with a CapEx &gt;$15 million to undertake a water balance study and identify and implement appropriate and proportionate* operational water efficiency measures.                     | D C No                             |                     |
| 8A         | Water efficient fixtures     | All new water-using appliances, shower heads, taps and toilets must be at least the average Water Efficiency Labelling Scheme (WELS) star rating by product type.                                      | D C No                             |                     |
| 9          | Low VOCs                     | All surface coatings to comply with the Australian Paint Approval Scheme (APAS) Volatile Organic Compounds Limits where fit for purpose                                                                              | D C Yes                            |                     |
| 10         | Air emissions reporting      | All mobile non-road diesel plant and equipment (with an engine greater than 19kW) to report engine conformity with relevant United States Environmental Protection Agency (US EPA), European Union (EU) or equivalent emissions standards and the fitting of any exhaust after-treatment devices. Reporting should be in accordance with the Air Emission Data Workbook – 9TP-FT-439. | D C Yes                            |                     |</p>
<table>
<thead>
<tr>
<th>Initiative</th>
<th>Theme</th>
<th>Description</th>
<th>Design (D) or Construct (C) Interface</th>
<th>Under consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Biodiversity offsetting</td>
<td>Biodiversity</td>
<td>All projects with non-significant biodiversity impacts to comply with the Infrastructure and Services Vegetation Offset Guide as applicable.</td>
<td>DC</td>
<td>Yes</td>
</tr>
<tr>
<td>12 Sustainable procurement for construction</td>
<td>Community benefit</td>
<td>All projects must: i. meet steel and timber sustainable procurement requirements; and ii. undertake sustainable procurement training for high impact suppliers.</td>
<td>DC</td>
<td>No</td>
</tr>
<tr>
<td>13 Urban Design</td>
<td>Community benefit</td>
<td>All projects to address the urban design principles in the TfNSW Interim Urban Design Best Practice Guidelines within their urban design and landscaping plan (UDLP).</td>
<td>DC</td>
<td>Yes</td>
</tr>
<tr>
<td>14 Innovation</td>
<td>Community benefit</td>
<td>The project is awarded at least 1 point for a single initiative against the ISCA Innovation Credit Inn-1 OR The project makes a contribution to industry and/or the local community in line with the project legacy categories specified (Note: the requirements are determined by CapEx).</td>
<td>DC</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix E  Construction Noise and Vibration Impact Assessment Report

SLR Consulting (2019)
Appendix F  Statement of Heritage Impact

GML Heritage (2019)
Appendix G  Arborist Assessment Report

Earthscape Horticultural Services (2019)