# Arncliffe Station Upgrade
# Review of Environmental Factors

## Transport Access Program

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# Abbreviations

| Abbreviation | Description |
|---|---|
| **AHIMS** | Aboriginal Heritage Information Management System |
| **ASS** | Acid Sulfate Soils |
| **BCA** | Building Code of Australia |
| **CBD** | Central Business District |
| **CCTV** | Closed Circuit TV |
| **CEMP** | Construction Environmental Management Plan |
| **CLM Act** | *Contaminated Land Management Act 1997* |
| **CMP** | Conservation Management Plan |
| **CNVMP** | Construction Noise and Vibration Management Plan |
| **CO** | Carbon monoxide |
| **CPTED** | Crime Prevention through Environmental Design |
| **CTMP** | Construction Traffic Management Plan |
| **DBH** | Diameter Breast Height |
| **DCP** | Development Control Plan |
| **DDA** | *Disability Discrimination Act 1992* (Commonwealth) |
| **DEC** | (former) NSW Department of Environment and Conservation |
| **DECC** | (former) NSW Department of Environment and Climate Change |
| **DoE** | Commonwealth Department of the Environment |
| **DP&E** | NSW Department of Planning and Environment |
| **DSAPT** | Disability Standards for Accessible Public Transport |
| **ECM** | Environmental Control Map |
| **EIS** | Environmental Impact Statement |
| **EMS** | Environmental Management System |
| **EPA** | Environment Protection Authority |
| **EP&A Act** | *Environmental Planning and Assessment Act 1979* |
| **EP&A Regulation** | *Environmental Planning and Assessment Regulation 2000* |
| **EPBC Act** | *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) |
| **EPL** | Environment Protection Licence |
| **ESD** | Ecologically Sustainable Development (refer to Definitions) |
| **FM Act** | *Fisheries Management Act 1994* |
| **Heritage Act** | *Heritage Act 1977* |
| **ICNG** | *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2000). |
| **Infrastructure SEPP** | *State Environmental Planning Policy (Infrastructure) 2007* |
| **INP** | *NSW Industrial Noise Policy* (EPA, 2000) |

| Abbreviation | Description |
|---|---|
| **LEP** | Local Environmental Plan |
| **LGA** | Local Government Area |
| **NCA** | Noise Catchment Area |
| **NES** | National Environmental Significance |
| **NM** | Noise monitoring location |
| **NML** | Noise Management Level (non-residential receivers) |
| **$NO_2$** | Nitrogen dioxide |
| **Noxious Weeds Act** | *Noxious Weeds Act 1993* |
| **NPW Act** | *National Parks and Wildlife Act 1974* |
| **NV Act** | *Native Vegetation Act 2013* |
| **$O_3$** | Ozone |
| **OEH** | NSW Office of the Environment and Heritage |
| **PCB** | Polychlorinated Biphenyls |
| **PM** | Particulate Matter |
| **POEO Act** | *Protection of the Environment Operations Act 1997* |
| **PSNC** | Proposal Specific Noise Criteria (residential receivers) |
| **RailCorp** | Rail Corporation of NSW (now Sydney Trains) |
| **RBL** | Rating Background Level |
| **REF** | Review of Environmental Factors (this document) |
| **RNP** | *Road Noise Policy* (DECCW, 2011) |
| **Roads Act** | *Roads Act 1993* |
| **SEPP** | State Environmental Planning Policy |
| **$SO_2$** | Sulfur dioxide |
| **SoHI** | Statement of Heritage Impact |
| **TCP** | Traffic Control Plan |
| **TPD** | Transport Projects Division (Transport for NSW) |
| **TSC Act** | *Threatened Species Conservation Act 1995* |
| **UDLP** | Urban Design Landscape Plan |
| **VOC** | Volatile Organic Compound |
| **WARR Act** | *Waste Avoidance and Resource Recovery Act 2001* |

# Definitions

| Definition | Description |
|---|---|
| **Burrows Street compound** | It is proposed to utilise vacant land owned by the Roads and Maritime Services on Burrows Street for temporary commuter parking and as the main construction compound (site sheds, lunch rooms, changing rooms, staff amenities, storage containers, laydown areas and staff parking). |
| **Commuter car park compound** | It is proposed to utilise the commuter car park area adjacent to the eastern side of the station as a secondary compound to allow for safe vehicle access to the rail corridor and storage of equipment and materials. Construction of accessible car spaces and a lift would also be undertaken in this area. |
| **Concept Design** | The Concept Design is the preliminary design presented in the REF, which would be refined by the Contractor (should the Proposal proceed) to a design suitable for construction (subject to Transport for NSW acceptance).<br>Transport for NSW contracts a single entity (the Contractor) to further develop the Reference Design to a level suitable for construction. The Contractor therefore becomes responsible for all work on the project. |
| **Design and Construct Contract** | A method to deliver a project in which the design and construction services are contracted by a single entity known as the Contractor. The Contractor completes the project by refining the Concept Design presented in the REF (subject to Transport for NSW acceptance) to be suitable for construction. The Contractor is therefore responsible for all work on the project, both design and construction. |
| **Ecologically Sustainable Development** | As defined by clause 7(4) Schedule 2 of the EP&A Regulation.<br>Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased. |
| **Feasible** | A work practice or abatement measure is feasible if it is capable of being put into practice or of being engineered and is practical to build given project constraints such as safety and maintenance requirements. |
| **$L_{Aeq}$** | The equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound. |
| **$L_{A90}$** | The noise level present for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration). |
| **Noise sensitive receiver** | In addition to residential dwellings, noise sensitive receivers include, but are not limited to, hotels, entertainment venues, pre-schools and day care facilities, educational institutions (e.g. schools, TAFE colleges), health care facilities (e.g. nursing homes, hospitals), recording studios and places of worship/religious facilities (e.g. churches). |
| **$PM_{10}$** | Particulate matter that is less than 10 micrometres in diameter. |
| **Proponent** | A person or body proposing to carry out an activity under Part 5 of the EP&A Act - in this instance, Transport for NSW. |
| **Rail possession** | Possession is the term used by railway building/maintenance contractors to indicate that they have taken possession of the track (usually a block of track) for a specified period, so that no trains operate for a specified time. |

| Definition | Description |
|---|---|
| | This is necessary to ensure the safety of workers and rail customers. |
| **Reasonable** | Selecting reasonable measures from those that are feasible involves making a judgment to determine whether the overall benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the measure. |
| **Sensitive receivers** | Land uses which are sensitive to potential noise, air and visual impacts, such as residential dwellings, schools and hospitals. |
| **Sky glow** | The brightening of the night sky above towns, cities and countryside. |
| **Sydney Trains** | On 1 July 2013, Sydney Trains replaced CityRail as the provider of metropolitan train services for Sydney. Intercity services from the Sydney CBD that were also formerly operated by CityRail are now run by the new NSW Train Link, who also operates Regional services to destinations around NSW and Brisbane, Canberra and Melbourne. Regional services were previously operated by CountryLink. |
| **The Proposal** | The construction and operation of the Arncliffe Station Upgrade. |
| **Vegetation Offset Guide** | The Transport for NSW 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 111 of the *EP&A Act 1979*.<br>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. |

# Executive summary

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

The Proposal is consistent with the objectives of the Transport Access Program which is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

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 Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

## Description of the Proposal

The Proposal would provide a number of improved features to provide an accessible station and improved interchange facilities. The development of the design has also considered the existing heritage values of Arncliffe Station which is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the *Rockdale Local Environmental Plan 2011*.

The key features of the Proposal are summarised as follows:

- new structure with four lifts near the existing footbridge to provide access from both sides of the station and to each of the island platforms
- new canopy awning and security screens installed along the length of the existing footbridge (supported on a separate structure cantilevered from the lift structures)
- new canopy awnings installed on Platforms 2 and 3 between the new lifts and existing platform buildings
- upgrade of existing stairs, signage and associated tactile indicators
- new family accessible toilets installed on each island platform
- provision of bus bays and shelters and new taxi/kiss and ride area on Firth Street
- two new accessible parking spaces in the commuter car park and accessible footpath to the station entry
- bicycle racks installed on both sides of the station
- landscaping works
- minor restoration to heritage structures
- CCTV upgrades
- new concrete deflection walls to the southern side of the main footbridge protecting piers
- services relocation/upgrades as required.

Subject to approval, construction is expected to commence in mid-2015 and take up to 18 months to complete.

A detailed description of the Proposal is provided in Chapter 3 of this REF.

## Need for the Proposal

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

The upgrades are designed to drive a stronger customer experience outcome, to deliver improved travel to and between modes, encourage greater public transport use and better integrate interchanges with the role and function of town centres. The Proposal would also assist in responding to forecast growth in the region and would support growth in commercial and residential development.

Transport for NSW identified the need for improved access at Arncliffe Station, which does not currently meet key requirements of the Disability Standards for Accessible Public Transport (DSAPT) or the Commonwealth *Disability Discrimination Act 1992* (DDA).

The Proposal is consistent with the aims of the Transport Access Program as it would provide:

- improved accessibility for customers using Arncliffe Station – including the provision of an accessible route for the mobility impaired to station platforms
- improved transport interchange facilities including a new vehicle bay for the bus stop and taxi/kiss and ride area on the western side of the station; bicycle racks installed on both sides of the station and new accessible parking at the commuter car park
- improved customer amenity and facilities at the station, including two new family accessible toilets and canopies for weather protection.

The Proposal is also consistent with key planning strategies in NSW, including *NSW 2021 – Making NSW Number One* (Department of Premier and Cabinet, 2011) and the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012a).

## Options considered

Options for improving access to Arncliffe Station were developed by Transport for NSW, relevant stakeholders and the project design team. Four concept design options were developed to address station needs and other design principles. Each proposed different footbridge and concourse arrangements. Other proposed improvements such as new lifts, upgrade of stairs and shelters, and bicycle facilities were similar for all options. A preferred option was then selected to progress to the next phase of planning. Refer to Section 2.3 for more information on options development.

## Statutory considerations

The EP&A Act provides for the environmental impact assessment of development in NSW. Part 5 of the EP&A Act generally specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as Transport for NSW, which do not require development consent.

*State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP) is the primary environmental planning instrument relevant to the proposed development and is the key environmental planning instrument which determines that this Proposal is permissible without consent and therefore is to be assessed under Part 5 of the EP&A Act.

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. 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'.

As Transport for NSW is a public authority and the proposed activity falls within the definition of rail infrastructure facilities under the Infrastructure SEPP, the Proposal is permissible without consent. Consequently the environmental impacts of the Proposal have been assessed by Transport for NSW under Part 5 of the EP&A Act.

In accordance with section 111 of the EP&A Act, Transport for NSW, 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 proposed activity.

This REF has been prepared to assess the construction and operational environmental impacts of the Proposal. The REF has been prepared in accordance with clause 228 of the *Environment Planning and Assessment Regulation 2000* (the EP&A Regulation).

Chapter 6 of this REF presents the environmental impact assessment of the Arncliffe Station Upgrade in accordance with these requirements.

## Community and stakeholder consultation

Under the Infrastructure SEPP, consultation is required with local councils or public authorities in certain circumstances, including where council-managed infrastructure is affected. Consultation has been undertaken with Sydney Trains, Rockdale City Council and the Heritage Division of the Office of Environment and Heritage during the development of design options and the preferred option. Consultation with these stakeholders would continue through the detailed design and construction of the Proposal.

Transport for NSW is also proposing to undertake the following consultation for the Proposal:

- notification to community stakeholders including but not limited to customers, local residents and businesses
- public display of the REF.

Community consultation activities for the Proposal would be undertaken during the public display period of this REF. The REF would be displayed for a period of approximately three weeks. Further information about these specific activities is included in Section 5.4 of this REF.

During this period, the REF will be available for viewing at Rockdale City Council, the Arncliffe Library and the Transport for NSW Community Information Centre. The REF would also be available to download from Transport for NSW's website and an information line (1800 684 490) is provided for members of the public to make enquiries.
Transport for NSW would review and assess all feedback received during the public display period, prior to determining whether or not to proceed with the Proposal.

Should the Proposal proceed to construction, the community would be kept informed throughout the duration of the construction period. Figure 1 presents an overview of the consultation and planning process and the current status of the Proposal.

## 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 noise and vibration impacts during construction
- temporary changes to vehicle and pedestrian movements to access the station and car parks during construction
- temporary disruptions to station facilities and amenities during construction
- loss of two parking spaces from Firth Street (southbound) and up to four parking spaces from the commuter car park on the eastern side of the station following completion of the Proposal
- impacts to heritage-listed items (footbridge, platform buildings, stairs)
- removal of a total of five trees that would require planting offsets and would have a minor local visual impact
- introduction of new elements, such as canopies and lifts, into the visual environment
- long term benefits include improved accessibility to the station and upgraded interchange facilities.

## Conclusion

This REF has been prepared having regard to sections 111 and 112 of the EP&A Act, and clause 228 of the EP&A Regulation, to ensure that Transport for NSW 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 Transport for NSW's *NSW Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a) taking into account the principles of ecologically sustainable development (ESD).

The assessments undertaken have concluded that the Proposal would not have significant impacts to the environment. Should the Proposal proceed, the likely impacts would be appropriately managed in accordance with the mitigation measures outlined in this REF. Accordingly, an environmental impact statement is not required for the Proposal, nor is the approval of the Minister for Planning required. Overall, the Proposal is expected to provide long term benefits for the customers of Arncliffe Station and the broader community, which outweigh the short term adverse impacts during construction.

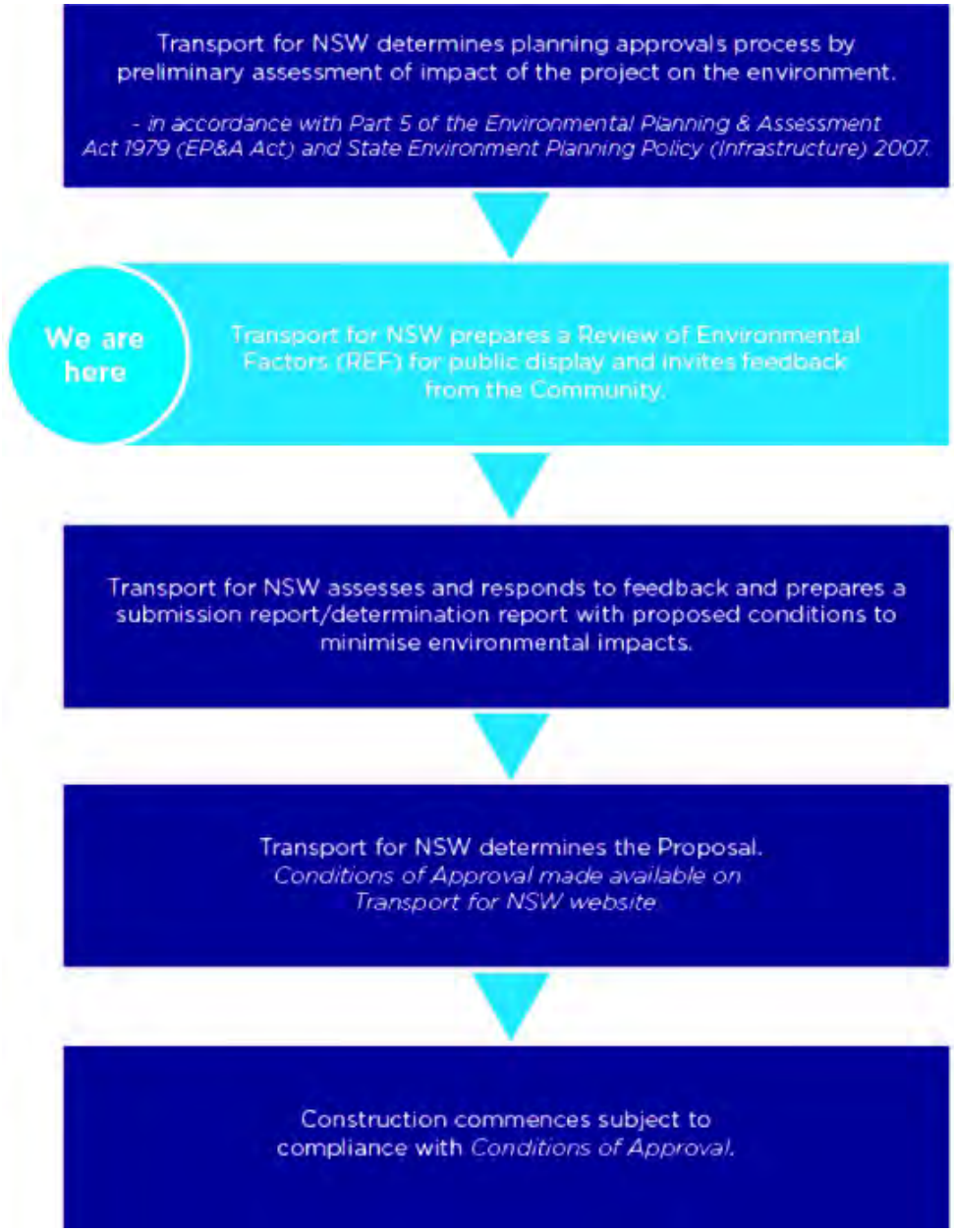



**Figure 1: Planning approval and consultation process for the Proposal**

# 1. Introduction

Transport for NSW was established in 2011 as the lead agency for integrated delivery of public transport services across all modes of transport in NSW. Transport for NSW is the proponent for the Arncliffe Station Upgrade (the Proposal), to be delivered by the Transport Projects Division (TPD).

## 1.1. Overview of the Proposal

### 1.1.1. The need for the Proposal

The NSW Government is committed to facilitating and encouraging use of public transport, such as trains, by upgrading stations to make them more accessible, and improving interchanges around stations with other modes of transport such as buses, bicycles and cars.

Arncliffe Station does not currently provide equitable access to station platforms, or meet key requirements of the Disability Standards for Accessible Public Transport (DSAPT) or the Commonwealth *Disability Discrimination Act 1992* (DDA). The platform is currently accessible by stairs only. There are no lifts or ramps and the existing arrangement is not suitable for the users of any wheeled vehicles (bicycles, prams, pushchairs/wheelchairs) or older people with reduced mobility.

The Arncliffe Station Upgrade is required to improve access to the station and surrounding car park/pedestrian areas to provide equitable access, and would also improve customer facilities and amenity. The improvements would in turn assist in supporting the growth in public transport use and would provide an improved customer experience for existing and future users of this station.

### 1.1.2. Key features of the Proposal

The Proposal would provide a number of improved features to provide an accessible station and improved interchange facilities. The development of the design has also considered the existing heritage values of Arncliffe Station which is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the *Rockdale Local Environmental Plan 2011*.

The key features of the Proposal are summarised as follows:

- new structure with four lifts near the existing footbridge to provide access from both sides of the station and to each of the island platforms
- new canopy awning and security screens installed along the length of the existing footbridge
- new canopy awnings installed on Platforms 2 and 3 between the new lifts and existing platform buildings
- new concrete deflection walls to the southern side of the main footbridge protecting piers
- upgrade of existing stairs, signage and associated tactile indicators
- new family accessible toilets installed on each island platform
- provision of bus bays and shelters and new taxi/kiss and ride area on Firth Street

- two new accessible parking spaces in the commuter car park and accessible footpath to the station entry
- bicycle racks installed on both sides of the station
- landscaping works
- minor restoration to heritage structures
- CCTV upgrades
- services relocation/upgrades as required.

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

Subject to planning approval, construction is expected to commence in mid-2015 and is anticipated to take up to 18 months to complete.

## 1.2. Location of the Proposal

The Proposal would involve upgrade works to Arncliffe Station which is located approximately eight kilometres south-west of the Sydney central business district (CBD) in the Rockdale Local Government Area (LGA) – refer to Figure 2 . The station is located within the town centre and is surrounded by residential and commercial premises.

Arncliffe Station is located on the T4 Eastern Suburbs and Illawarra Line and is the 125th busiest on the Sydney Trains network with approximately 3,480 trips recorded on an average weekday in 2013 (Transport for NSW Bureau of Transport Statistics).


**Figure 2: Regional context in relation to the Sydney CBD**

## 1.3. Existing infrastructure and land uses

Arncliffe Station is listed on the NSW Stage Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the *Rockdale Local Environmental Plan 2011*.

The station comprises two island platforms that are linked to the surrounding street network via a footbridge. The footbridge provides for pedestrian access across the railway and also includes a concourse building that provides ticketing services. There are currently uncovered stairs to access Platform 1/2 and Platform 3/4 from the footbridge, which are not accessible for the mobility-impaired.

There is a large Victorian brick building on Platform 1/2 that comprises attached awnings and an amenities block linked by an open courtyard. The current uses (from south to north) include storage, waiting room, local model railway club, followed by a disused garden bed and a disused amenities block.

The building on Platform 3/4 is smaller than the Platform 1/2 building but also features attached awnings and an amenities block linked by an open courtyard. The current uses (from south to north) are: male toilet, followed by a disused garden bed, female toilet/waiting area, and storage.

Arncliffe Station is considered to be one of the best examples of suburban station architecture from the 1880s railway boom period. The Statement of Significance notes:

> *Arncliffe Railway Station is of State historical significance as an important station on the Illawarra Line, demonstrating its development from 1884 to 1925, including adaptation of two wayside buildings for island use. The Arncliffe Railway Station is of historical significance as one of three remaining stations with 1880s 'second class' brick platform buildings on the Illawarra line, and is one of the best examples of suburban station architecture from the first period of construction on the Illawarra Line. The platform buildings are of aesthetic significance, the Platform 1/2 building being an elaborate Victorian Italianate style building with decorative cast iron columns and brackets to awnings, and elaborate detail, the Platform 3/4 building being an 1884 wayside platform building altered in 1923 to an island platform building. The Arncliffe Railway Station 1919 steel footbridge and stairs, the 1923 overhead booking office and the concrete and brick overbridge are considered to be good representative examples of their types.*

Arncliffe Station is bordered by Burrows Street to the east and Firth Street to the west. Shops associated with the retail centre of Arncliffe and some residential buildings are located along Firth Street and include restaurants, cafes, butcher, chemist and a childcare centre (refer Figure 3 ). Residential buildings, an at-grade commuter car park, the Scots Club and a neighbourhood park are located to the east of the station along Burrows Street.

The Princes Highway runs parallel to the railway line, approximately 200 metres to the east, and serves as a major access point for local employment activities. The M5 motorway tunnel is located below the northern end of the Arncliffe Station platforms.

There are three points of access to the station:

- via a footpath from the commuter car park on the eastern side of the station
- via a footpath from Butterworth Lane connecting to a long footpath situated between residential buildings and thick vegetation, known locally as 'the arcade', extending to Eden Street on the eastern side of the station

- via Firth Street from the western side.

Existing transport interchange arrangements available at Arncliffe Station include:

- commuter car parking on the eastern side of the station off Burrows Street (for around 30 vehicles) with additional time-restricted parking available on local streets
- bus routes to the station including a regular service (473) and two night ride routes (N10 and N11)

There are two sheltered bus stops on Firth Street and additional seats along the footpath. There is no formal taxi zone, or kiss and ride area, and no accessible parking spaces are currently provided at Arncliffe Station. A bicycle rack is situated on the eastern side of the station. Photographs of the existing station are provided in Images 1 to 5.

The Proposal site is located on land owned by RailCorp (station and commuter car park) and Rockdale City Council (Firth Street). Sydney Trains and Rockdale City Council are responsible for the operation and maintenance of these respective areas.

The locality is subject to ongoing land use change. Large scale high density residential and mixed use development has occurred on the eastern side of the rail corridor at Wolli Creek, and further development is expected. The majority of residential areas around the station are zoned for medium and high density residential development.

**Image 1: Panorama of the western (Firth Street) side of the station**

**Image 2: View of Platforms 1/2 looking north**


**Image 3: View of Platform 3/4 (looking east)**

**Image 4: Cypress trees along the western rail corridor boundary/Firth Street**


**Image 5: The cladding and roofing on the existing footbridge (looking south west)**


**Figure 3: Site locality**

## 1.4. Purpose of this Review of Environmental Factors

This REF has been prepared by Transport for NSW to assess the potential impacts of the proposed upgrade works to Arncliffe Station. For the purposes of these works, Transport for NSW is the proponent and the determining authority under Part 5 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 111 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* (EP&A Regulation).

This assessment has also considered the relevant provisions of other relevant environmental legislation, including the *Threatened Species Conservation Act 1995* (TSC 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 Transport Access Program and the specific objectives of the Proposal. This chapter also provides a summary of the options that have been considered during development of the Proposal and why the preferred option has been chosen.

## 2.1. Strategic justification

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 as such play a critical role in shaping the customer's experience and perception of public transport.

The Proposal is consistent with the objectives of the Transport Access Program. This program is designed to drive a stronger customer experience to deliver seamless travel to and between modes, encourage greater public transport use and better integrate station interchanges with the role and function of town centres within the metropolitan area and developing urban centres in regional areas of NSW.

The Proposal is consistent with the NSW Government's commitment to deliver an efficient and effective transport system around Sydney and NSW as detailed in *NSW 2021 – A Plan to Make NSW Number One* (Department of Premier and Cabinet, 2011).

NSW 2021 is the NSW Government's ten year plan to guide budget and decision making in NSW. NSW 2021 includes the following goals, targets and priority actions relevant to the Proposal:

- reduce travel times
- minimise public transport waiting times for customers
- improve co-ordination and integration between transport modes
- increase patronage on public transport
- improve public transport reliability
- improve customer experience with transport services.

The NSW Government has developed the *Long Term Transport Master Plan* (Transport for NSW, 2012a). The plan provides a clear direction for transport over the next 20 years, while building on current commitments.

The *Long Term Transport Master Plan* (Transport for NSW, 2012a) complements and builds on the visions and goals established in *NSW 2021* and this Proposal would support growth and improvements in the safe and efficient management of transport in the Sydney region.

The *2012-2017 Disability Action Plan* (Transport for NSW, 2012c) was developed by Transport for NSW in consultation with the Accessible Transport Advisory Committee, which is made up of representatives from peak disability and ageing organisations within NSW. The Disability Action Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job, and provides a solid and practical foundation for future progress over the next five years. The Proposal has been developed in consideration of the objectives outlined in this Plan.

*Rebuilding NSW - State Infrastructure Strategy 2014* is a plan to deliver $20 billion in new productive infrastructure to sustain productivity growth in our major centres and regional

communities (NSW Government, 2014). Rebuilding NSW will support overall population growth in Sydney and NSW.

Public transport is viewed as critical to urban productivity, expanding employment opportunities by connecting people to jobs, reducing congestion, and supporting delivery of urban renewal. Further details of the application of NSW Government policies and strategies are discussed in Section 4.5 of this REF.

### 2.1.1. Objectives of the Transport Access Program

The Proposal is consistent with the objectives of the Transport Access Program, which is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. The program aims to provide:

- stations that are accessible to those with disabilities, the ageing and parents/carers with prams
- modern buildings and facilities for all transport modes that meet the needs of a growing population
- modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers
- safety improvements including extra lighting, lift alarms, fences and security measures for car parks and interchanges, including stations, bus stops and wharves
- signage improvements so customers can more easily use public transport and transfer between modes at interchanges
- other improvements and maintenance such as painting, new fencing and roof replacements.

### 2.1.2. Objectives of the Proposal

The specific objectives of the Arncliffe Station Upgrade are to:

- provide a station that is accessible to those with disabilities, the ageing and parents/carers with prams
- improve customer facilities
- improve customer amenity
- improve the transport interchange area through improvements to the existing bus stop and new formalised kiss and ride/taxi zones and upgrade bicycle facilities
- enhance connections to the adjacent pedestrian and bicycle network
- be sympathetic to the heritage significance and ongoing heritage values of the station.

## 2.2. Design development

In 2013, SKM was commissioned to investigate the feasibility of a station upgrade to improve accessibility to the station, and identify key constraints and opportunities. Preliminary options were developed and examined in an options development workshop and a preliminary preferred option was identified which proposed changes to the heritage listed booking office.

In 2014, Transport for NSW commissioned Australian Museum Consulting to prepare a *Railway Overhead Booking Offices Heritage Conservation Strategy* . This report found that the existing booking office at Arncliffe Station had sufficient integrity (in terms of retention of substantial evidence of its original use, setting, architectural form, character and detailing) to have significant representative value, even though the booking office was replaced with a new structure in the 1920s. As a result of this study and in consultation with the Heritage Division, Transport for NSW decided that Arncliffe Station needed to be upgraded in a manner sympathetic to the heritage and broader station precinct significance, subject to the engineering and other constraints of the site.

SMEC Australia was then commissioned in 2014 to develop the concept design for the Proposal. Further options were identified, as discussed in Section 2.3, based on feedback from key stakeholders and consideration of heritage impacts.

## 2.3. Alternative options considered

### 2.3.1. Identified options

Four concept design options were developed to address station needs and other design principles, and are summarised below. Upgrades to provide new lifts, upgraded stairs, and interchange facilities were common to all options and were not considered as part of the options assessment. The four options focused on different arrangements required to upgrade the footbridge and concourse, and to improve station facilities.

### 2.3.2. Option 1 – replace footbridge, relocate facilities to platform buildings

Option 1 would replace the existing footbridge and concourse with a new footbridge at the same location, with four lifts to service the station platforms and the station entrances. Ticketing, staff and passenger facilities would be provided in the existing heritage station buildings on both platforms.

This option would maximise the opportunities to achieve compliance with DDA and Building Code of Australia (BCA) standards and present potential long term maintenance savings. The structure and the associated clearances to the rail tracks would be designed to achieve the preferred minimum requirements.

### 2.3.3. Option 1A – replace footbridge and aerial concourse

Similar to Option 1, Option 1A would replace the existing footbridge and concourse with a new footbridge at the same location. In Option 1A, a new concourse building would be constructed in the same location as the existing concourse building and ticketing and staff facilities would be provided from this new location.

Option 1A would have similar operational outcomes to Option 1.

### 2.3.4. Option 2 – new footbridge at northern end, relocation of facilities into platform buildings

This option would involve the construction of a new footbridge at the northern end of the platform. New station entrances would be constructed on Firth Street and Burrows Street. Station facilities including ticketing and waiting rooms would be relocated to the existing station buildings on the platforms.

The M5 motorway tunnel alignment would be located directly beneath the new footbridge. Under this option, the existing concourse would be demolished and the existing footbridge could be retained or demolished. The commuter car park would require reconfiguration to interface with the new station entrance and meet current standards, including the provision of disabled parking bays. This would result in the loss of 15 parking spaces from the commuter car park and 15 parking spaces from Firth Street.

### 2.3.5. Option 3 – strengthen existing footbridge structures, retain existing concourse building

Option 3 would retain the existing heritage listed footbridge and concourse buildings. However as the footbridge is not strong enough to support the extra weight of the additional features required, a separate structure adjacent to the footbridge that could provide a secure base for the four lift shafts, footbridge and platform canopies, security screens and other new items would be required to upgrade the station and to improve accessibility to the station.

This option would allow the introduction of the new elements into the station precinct, while having minimal physical impact on the existing heritage structures, all of which would be retained.

### 2.3.6. The do-nothing option

The NSW Government has identified the need for improving the accessibility of transport interchanges, train stations and commuter car parks across NSW as a priority under the Transport Access Program.

The ‘do nothing‘ option was not considered a feasible alternative as it is inconsistent with NSW Government objectives and would not help encourage the use of public transport and would not meet the immediate needs of the Arncliffe community.

## 2.4. Justification for the preferred option

Options 1 and 1A were not selected because they would result in the complete loss of the State-heritage listed footbridge and concourse building and their relationship to the existing platform buildings which are also part of the heritage listing. This would be detrimental to the

heritage values and ongoing heritage significance of the station. Following consultation with the Heritage Division, it was considered that the heritage impacts associated with this option were unacceptable and this option was not considered further.

Furthermore, Option 1 would require the duplication of ticketing staff and passenger facilities on each platform rather than being contained within a central concourse, which is the preferred operational layout for Sydney Trains. There would be higher ongoing maintenance costs in maintaining and managing these separate facilities.

Option 2 was not selected, as the location of the new station entry at the northern end of the station would move pedestrians away from the Arncliffe town centre and the majority of the shops, thereby having a negative impact on local businesses and providing a reduced amenity for local users. This option would also have had a significant impact on the heritage values of Arncliffe Station, removing many of the station functions away from the heritage buildings and structures and thereby reducing the importance of their continued heritage significance. This option may also have led to the demolition of the heritage buildings and structures.

Option 2 was also located directly above the M5 motorway tunnel which carried other structural challenges and inherent risks to infrastructure. Lastly, Option 2 would result in the loss of 15 parking spaces along Firth Street as a result of the new pedestrian crossing and reconfiguration required. It would also result in the loss of parking spaces in the commuter car park.

The preferred option (Option 3) was selected for the following reasons:

- provides a design to improve the accessibility of the station
- retains the four heritage railway station buildings and the footbridge while providing improved access and functionality to the station
- provides a modern upgrade to the station with minimal intervention to the heritage elements of the station
- has the least impact on the current and future railway and community related uses which would continue at the station and surrounds
- provides enhanced entry points to the station with increased visibility, safety and amenity for all users.

# 3. Description of the Proposal

Chapter 3 describes the Proposal and summarises key design parameters, construction methodology, and associated infrastructure and activities. The description of the Proposal is based on the concept design (SMEC, 2015), with some minor modifications as a result of further consultation with stakeholders, and is subject to detailed design.

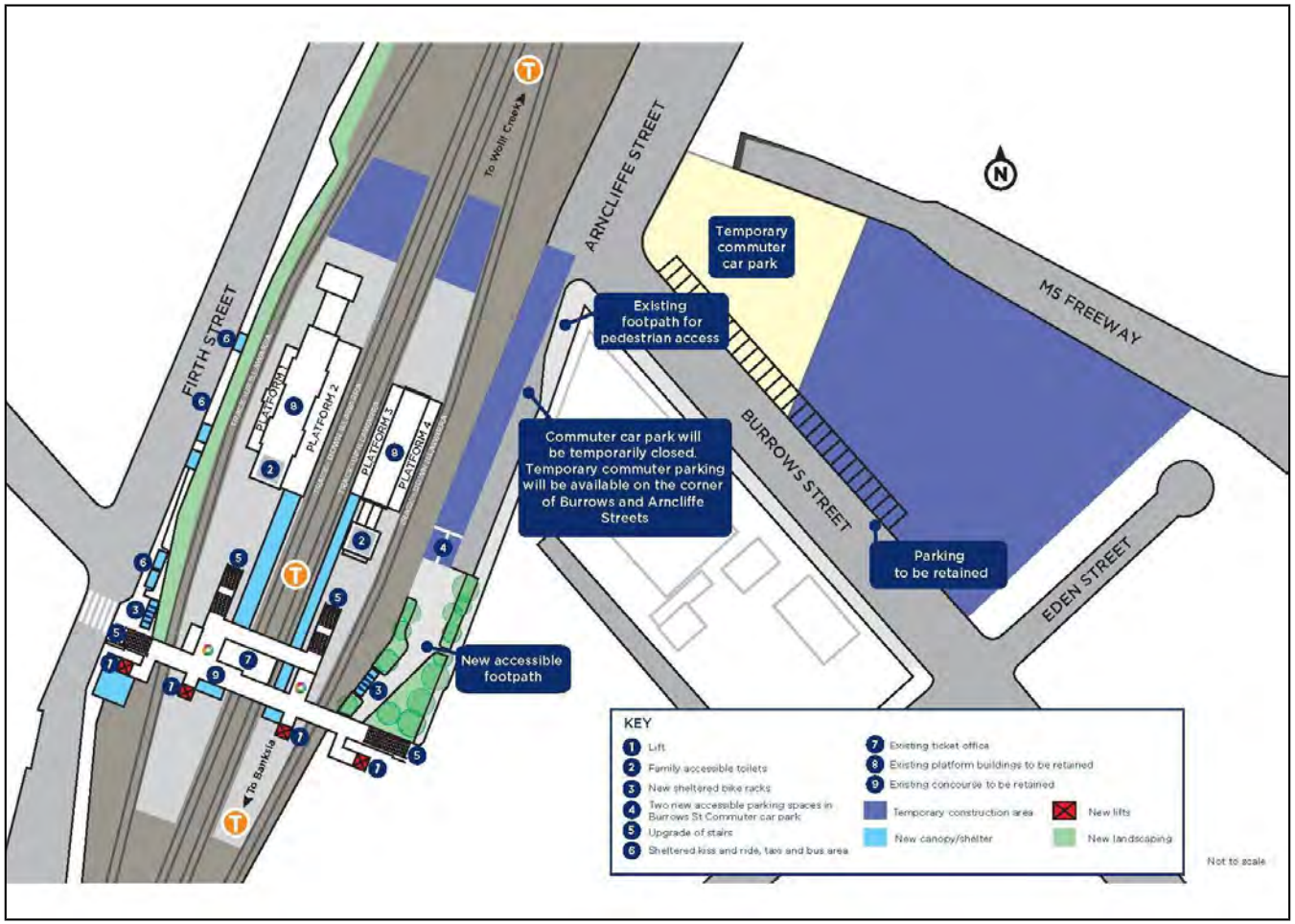
## 3.1. The Proposal

As described in Section 1.1, the Proposal involves an upgrade of Arncliffe Station which would improve accessibility and amenities for customers.

The Proposal would include a number of improved features to provide an accessible station and improved interchange facilities. The Proposal would include the following key elements:

- new structure with four lifts near the existing footbridge to provide access from both sides of the station and to each of the island platforms
- new canopy awning and security screens installed along the length of the existing footbridge
- new canopy awnings installed on Platforms 2 and 3 between the new lifts and existing platform buildings
- new concrete deflection walls to the southern side of the main footbridge protecting piers
- upgrade of existing stairs, signage and associated tactile indicators
- new family accessible toilets installed on each island platform
- provision of bus bays and shelters and new taxi/kiss and ride area on Firth Street
- two new accessible parking spaces in the commuter car park located to the east of the station and accessible footpath to the lift
- bicycle racks installed on both sides of the station
- landscaping works
- minor restoration to heritage structures
- CCTV upgrade
- services relocation/upgrades as required.
- construction of a new section of retaining wall along the rail boundary, immediately north of the western entrance to the station
- partial demolition of a vacant shop located immediately to the south of the existing station entry stairs on Firth Street to allow space for the lift structure and required clearances
- replacement of a power transformer located within the rail corridor off Arncliffe Street north of the platforms in order to achieve the additional power supply for the new lifts.
- potential for the existing 33 kV aerial cables (that run along the eastern side of the corridor boundary) to be undergrounded.

Figure 4 shows the key features of the Proposal.




Note: Image is indicative only. Subject to detailed design.

**Figure 4: Concept plan of the Arncliffe Station Upgrade**

### 3.1.1. Design features

**New lifts and footbridge infrastructure**

Four new lifts would be installed at the Firth Street entrance, at Platform 1/2, at Platform 3/4 and at the commuter car park entrance. The lifts would be set back around three metres from the existing footbridge on the southern side. Access from the lifts to the footbridge would be via cantilevered landings that would be supported off the lift structures.

A new canopy covering the full length of the existing footbridge would be constructed to provide weather protection, supported off the lift structures. Full height glass security barriers and balustrades would also be installed along the southern edge of the footbridge supported off the lift structures. Anti-throw screens would be installed on the northern side of the footbridge, along the eastern and western sides of the concourse building, and the upper sections of the stairs.

A vacant shop on Firth Street (situated on RailCorp land, within the curtilage but not part of the heritage listing ) would be partially demolished to allow space for the lift structure and required clearances. It is proposed that the remaining section of the shop would be used as a Communications Room during operation.

The existing heritage-listed concourse adjacent to the footbridge which contains a newsagent, ticket office and Station Master's office would not be directly impacted as part of the Proposal.

The location of the new infrastructure has been selected to minimise the visual and heritage impacts on the station by retaining the visual connection between the heritage-listed platform buildings and the existing heritage footbridge/concourse building. The design intention of the new infrastructure is to have minimal direct contact or intervention with the existing heritage fabric/elements of the station. The new structures would be constructed of modern materials, including concrete, steel and glass, to provide a functional and unobtrusive finish that allows the heritage buildings and structures to remain dominant.

The existing Colorbond metal covering over the footbridge adjacent to the ticket office is not part of the heritage elements of the footbridge and would be removed as part of the Proposal.

**New canopy awnings on Platforms 2 and 3**

New canopies would be installed on Platforms 2 and 3 to provide weather protection for customers between the new lifts and the existing station building awnings.

**Upgrade of stairs, signage and tactile indicators in line with DDA and BCA requirements**

The following activities are proposed to address existing deficiencies in the DDA and BCA requirements at Arncliffe Station:

- upgrade the stairs to Platform 1/2 and Platform 3/4 to achieve safe tread spacing, length of flight and extend the handrails (the existing heritage balustrades on these stairs would be retained)
- install new wayfinding signage throughout the station.

Sheltered access from the lifts to the platforms is provided by new platform canopies. There is no proposed canopy over the stairs leading down to the platforms and this is regarded as a better design response to the heritage precinct.

**New family accessible toilets on Platform 1/2 and 3/4**

The existing male toilets at the southern end of the station building on Platform 3/4 would be upgraded to contain a family accessible toilet. A privacy wall located parallel to the southern face of the building would be removed.

On Platform 1/2 a new family accessible toilet would be installed within a vacant section of the southern station building. The existing retail tenant's toilet would remain unchanged.

**Interchange facilities – eastern side**

Two accessible parking spaces would be created in the commuter car park by extending the car park to the south, close to the station entrance. In order to achieve this, one Cypress tree would be removed.

A new DDA compliant footpath would be constructed extending from the commuter car park to the lifts on the eastern side of the station. The existing bicycle rack would be temporarily relocated during construction and new bicycle racks would be installed close to the station entry upon operation.

During construction, the commuter car park would be temporarily relocated to the Burrows Street compound site for the safety of customers and staff. This is further discussed in Section 3.2.5.

Based on the concept design, there is potential for a net loss of up to four parking spaces at the commuter car park. While loss of parking would be minimised as far as possible there would be some loss to accommodate two DDA spaces and an accessible path to the station entry, as required under the Disability Standards for Accessible Public Transport (DSFAPT). However, adequate parking exists within 150 metres of the station entry. During detailed design, the intention is to minimise any loss of commuter parking spaces.

**Interchange facilities – western side**

The footpath on Firth Street extending north from the western station entrance would be widened to 2.5 metres. A new indented vehicle bay would provide the kerb space allocation for two taxis and two standard buses. The provision of the bus and taxi spaces, and a small landscaped forecourt with seating and bike racks would result in the permanent removal of two parking spaces from Firth Street. New shelters would be installed on the eastern side of the footpath. A part-time kiss and ride space would be provided. During construction of the interchange facilities, there would be a temporary loss of parking spaces along Firth Street southbound, to the north of the station entry; however parking would be reinstated following the completion of these activities.

A new section of retaining wall would be constructed along the rail boundary immediately north of the western entrance to the station to accommodate a larger forecourt area and interchange area. It would require the removal of four trees. Replacement trees would be provided.

**Power supply**

A power transformer is located within the rail corridor off Arncliffe Street north of the platforms. This transformer would be replaced in order to achieve the additional power supply required for the new lifts. Trenching would be required within the rail corridor to provide electricity to the new lifts.

There is potential for the existing 33 kV aerial cables (that run along the eastern side of the corridor boundary) to be undergrounded, if required. This would require trenching/installing within the rail corridor in galvanised steel troughs.

### 3.1.2. Engineering constraints

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

**Existing structures:** the placement and integrity of existing structures needed to be considered during the development of the design. These structures include the station/concourse buildings, and the footbridge, including supporting structures.

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

**Utilities:** A 'Dial Before You Dig' survey and 'Detailed Services Search' has identified a number of utilities in the vicinity of the proposed works including:

- electrical services, signalling and communication cables beneath the platform surfaces which impact on the footings for the new lifts and supporting structure
- rail utilities including signalling and cabling.

**Other considerations:**

Arncliffe Station is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the *Rockdale Local Environmental Plan 2011* (Rockdale LEP). The station has historical, aesthetic and social rarity and representativeness significance with good integrity. The design has endeavoured to achieve the necessary upgrade to provide DDA compliant access to the station with minimal influence on the heritage fabric.

It was considered to retain the existing location of the bus stop on Firth Street to maintain a similar configuration for operational ease.

### 3.1.3. Design standards

The Proposal would be designed having regard to the following:

- Disability Standards for Accessible Public Transport (2002) (issued under the Commonwealth *Disability Discrimination Act 1992*)
- Building Code of Australia
- relevant Australian Standards
- Asset Standard Authority standards
- Sydney Trains guidelines
- *NSW Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a)
- *Guidelines for the Development of Public Transport Interchange Facilities* (Ministry of Transport, 2008)
- Crime Prevention through Environmental Design (CPTED) principles.

### 3.1.4. Sustainability in design

The detailed design of the Proposal would be undertaken in accordance with the project targets identified in Transport for NSW's Environmental Management System (EMS) and the *Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a) which groups sustainability into seven themes:

- energy and greenhouse gases
- climate resilience

- materials and waste
- biodiversity and heritage
- water
- pollution control
- community benefit.

Within each theme, potential initiatives are prioritised into two categories of requirements:

- **Compulsory** – the initiative is required to be implemented when applicable to the project as it refers to a corporate target, or is fundamental to the delivery of sustainable assets
- **Discretionary** – the initiative has benefits to be implemented, however may not be the most appropriate.

The Guidelines also specify a minimum level of compliance within each category: 100 per cent of applicable Compulsory initiatives and 50 per cent of the applicable Discretionary points are to be explored through each stage of design. The Proposal would be required to implement sustainability initiatives to achieve a Silver Rating as per the guidelines.

## 3.2. Construction activities

### 3.2.1. Work methodology

Subject to approval, construction is expected to commence in mid-2015 and take up to 18 months to complete. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with Transport for NSW.

The proposed construction activities for the Proposal are identified in Table 1. This staging is indicative and is based on the current design and may change once the detailed design methodology is finalised, and is also dependent on the Contractor's preferred methodology, program and sequencing of the work.

**Table 1: Indicative construction stages for key activities (subject to detailed design)**

| Activity | Equipment |
|---|---|
| **Site preparation**<br>Establishment of site boundaries and compound sites, erection of signs, site delineation fencing, vegetation removal, transformer upgrade, mobilisation of site sheds, amenities and storage areas. | 20 tonne excavator<br>10 tonne trucks<br>Hand and power tools<br>Construction vehicles<br>Delivery vehicles<br>Mobile crane<br>Containers<br>Mulchers |
| **Relocation of services and preparation of structure**<br>Relocation of utilities on platform, construction of substructure for lifts, partial demolition of vacant shop on Firth Street | 20 tonne excavators<br>10 tonne trucks<br>Supersucker<br>Water cart<br>Concrete saws<br>Jackhammers<br>Hand tools<br>Power tools |
| **Preparation of structure – piling works**<br>Construction of footings and support structures for lifts at the street | 20 tonne excavator<br>10 tonne truck |

| Activity | Equipment |
|---|---|
| entrances and on the island platforms.<br><br>Some activities would need to be undertaken during rail possession periods. | Mobile cranes<br>Piling machines<br>Concrete pump<br>Concrete truck<br>Hi-rail flatbed<br>Generators<br>Day makers<br>Hand tools<br>Excavator |
| **Construction of lift shafts, canopies and stairs**<br>Construction of lift shafts, upgrade of stairs, installation of canopies over footbridge and along platforms, retaining walls, deflection walls and canopy footings.<br><br>Some activities would need to be undertaken during rail possession periods. | Jackhammers<br>Generators<br>10 tonne trucks<br>Piling machines<br>Concrete pumps<br>Concrete trucks<br>Mobile cranes<br>Elevated Work Platform<br>Hand tools<br>Excavator |
| **Construction of station interchange facilities**<br>Widening of footpath in Firth Street and construction of new vehicle bay (for bus stop, new taxi) along with new shelters, reconfiguration of the commuter car park to include accessible parking spaces, and installation of bicycle racks on both sides of the station. | 20 tonne excavator<br>10 tonne trucks<br>Mobile crane<br>Concrete pumps<br>Concrete trucks<br>Elevated work platform<br>Hand tools<br>Jackhammers |
| **Construction of external cladding**<br>Completion of lift shafts, new glazing on footbridge, installation of anti-throw screens, landscaping works, new family accessible toilets, and upgrade of CCTV. | 20 tonne excavator<br>10 tonne trucks<br>Mobile crane<br>Water cart<br>Elevated work platform<br>Hand tools<br>Jackhammers |

### 3.2.2. Working hours

The majority of 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 would need to occur outside standard hours and would include night works, weekends and works during routine track 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.

Work outside standard hours is 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. It is likely that approximately seven possession periods would be required during the construction period to facilitate the following types of activities:

- detailed site survey, services investigations and geotechnical investigation works within and around the tracks
- installation of temporary demarcation fencing/hoardings to allow works to be undertaken during non-possession periods
- upgrades to existing stairs and minor structural modifications located above and between tracks
- installation of lift structural components, elevated landings and canopy components using cranes
- civil works including foundations and construction for structures adjacent to tracks
- testing and commissioning of station communications systems and equipment including augmentation of station CCTV and ticketing systems
- testing and commissioning/cutover of new lifts and upgraded station power supply.

Work outside standard hours may also be scheduled outside possession periods. Approval from Transport for NSW would be required for any work outside standard hours and the affected community would be notified as outlined in Transport for NSW's *Construction Noise Strategy* (Transport for NSW, 2012b) (refer to Section 6.3 for further details).

### 3.2.3. Earthworks

The Proposal would require a small amount of earthworks. Excavation and earthworks would generally be required for the following:

- pits for the proposed lift shafts
- footpath widening, construction of vehicle bay for bus stop and new taxi/kiss and ride zone and shelters, and retaining wall along the rail corridor
- construction of new footpath and accessible parking spaces at the commuter car park
- other minor civil works including footings and foundation for structures, and trenching activities for service adjustments and relocations.

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

### 3.2.4. 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 Transport for NSW's *NSW Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a). Materials would be sourced from local suppliers where practicable. Reuse of existing and recycled materials would be undertaken where practicable.

### 3.2.5. Traffic access and vehicle movements

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

The commuter car park on the eastern side of the station, which has capacity for approximately 30 parking spaces, would be closed for the duration of construction for the safety of customers and staff. The closure of the commuter car park would allow for

construction vehicles to enter and exit, negating pedestrian and motorist interface with construction vehicles. The closure would also allow for the site to be used as a secondary construction compound and for materials to be delivered safely and stored close to the site. Construction of the lift shafts on the eastern side of the station and the accessible car parking spaces in this area would also require the car park to be closed.

Alternate commuter parking for approximately 30 spaces would be provided on part of the Roads and Maritime Services owned land off Burrows Street (Burrows Street compound) about 40 metres from the northern end of the existing car park. Lighting, signage and traffic control measures would be used to assist customers accessing the station. Additional car parking is also available on the northern side of the existing commuter car park, adjacent to the rail corridor, off Burrows Street. The majority of heavy vehicle movements would be contained on the eastern side of the station, reducing the potential impacts on Arncliffe town centre to the west.

It is anticipated that access to the footbridge and stairs would be maintained to the greatest extent possible as it is recognised that this provides an important east/west pedestrian link across the railway line for local residents.

The potential traffic and access impacts expected during the construction of the Proposal include:

- temporary impacts to pedestrian access along the eastern side of Firth Street, north of the station entrance as a result of short-term diversions during footpath and vehicle bay works
- temporary bus stop relocation on Firth Street to allow for construction of the new vehicle bay
- temporary lane closure, southbound, on Firth Street during construction of new vehicle bay for bus stop, new taxi/kiss and ride area
- temporary parking displacement during construction as a result of the closure of the commuter car park (for the duration of construction only) which may affect rail customers and visitors to the Scots Club, which is situated at the intersection of Burrows Street and Arncliffe Street opposite the station and commuter car park
- temporary weekend closures of Arncliffe Station to construct new lifts, concourse extension and canopy installation with a temporary shuttle bus in operation
- additional heavy vehicle movements and construction vehicle movements
- although works would be staged to minimise impacts to rail customers and pedestrian, there is the potential for minor impacts to rail customers, pedestrians and staff as a result of works during standard hours.

A detailed construction methodology and associated management plans (such as a Construction Environmental Management Plan (CEMP)) would be developed prior to construction commencing to manage impacts.

### 3.2.6. Ancillary facilities

During construction, the following facilities will be required:

- construction compound, including site office and amenities
- plant and equipment storage area
- stockpile areas.

The main construction site compound for the Proposal would be situated on vacant land off Burrows Street which is owned and maintained by Roads and Maritime Services (refer Figure 3). This site would be used for replacement commuter parking, site sheds, lunch rooms,

changing rooms, staff amenities, storage containers, laydown areas, stock piling and staff car parking. This site would also be used as the compound site for the Arncliffe Pedestrian Link project which commenced construction in early 2015.

In addition, the commuter car park located immediately to the east of the station would be utilised as a secondary compound area for equipment and material storage and vehicle deliveries. The northernmost section of the platforms would also be used as temporary compound sites for the storage of construction materials.

The use of the two ancillary sites (Burrows Street compound and commuter car park compound) is discussed further in the relevant sections in Chapter 6 of this REF and where required mitigation measures to manage the potential impacts have been identified.

### 3.2.7. Public utility adjustments

A range of utilities are located on or adjacent to the Proposal site. Preliminary investigations have identified electrical and communications utilities located along the platform, as listed in Section 3.1.2. These utilities are owned by Sydney Trains. The identified utilities would require relocation and this would be undertaken within the rail corridor. New water, power and sewer connections would be installed for the family accessible toilet facilities on the station platforms.

There is also the potential for the existing 33kV aerial cables (that run along the eastern side of the corridor boundary) to be undergrounded, if required. This would require trenching/installing in galvanised steel troughs. This work would be undertaken within the rail corridor.

Further service investigation may be required, although the Proposal has been designed to limit the amount of service relocation where feasible. In the event that works would be required outside the Proposal footprint, further assessment would be undertaken.

The appropriate utility providers would be consulted during the detailed design phase.

## 3.3. Property acquisition

No property acquisition would be required as part of the Proposal.

All work within the rail corridor and the commuter car park would be on land owned by RailCorp and managed by Sydney Trains. The Burrows Street compound would be located on vacant land owned by Roads and Maritime Services. Works for the widened footpath and new interchange facilities on Firth Street would be on land owned by Rockdale City Council. Consultation with Rockdale City Council and Roads and Maritime Services is discussed in Chapter 5 and would be ongoing throughout the proposed development.

## 3.4. Operational management and maintenance

The management and maintenance of Arncliffe Station would continue to be the responsibility of Sydney Trains. It is proposed that Rockdale City Council operate and maintain applicable footpaths and sheltered areas on Firth Street. Further consultation with Council will be undertaken.

# 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 on Commonwealth land. These matters are considered in full in Appendix 1.

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 Part 5 of the EP&A Act. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as Transport for NSW, which do not require development consent under Part 4 of the Act.

In accordance with section 111 of the EP&A Act, Transport for NSW, 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. Having regard to these provisions, Transport for NSW has determined that no significant environmental impact is likely, and as a consequence an environmental impact statement is not required, nor is the approval of the Minister for Planning.

Clause 228 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) defines the factors which must be considered when determining if an activity assessed under Part 5 of the EP&A Act has a significant impact on the environment.

Chapter 6 of this REF provides an environmental impact assessment of the Proposal in accordance with clause 228. Appendix 2 specifically responds to the factors for consideration under clause 228.

### 4.2.2. Other NSW legislation and regulations

Table 2 provides a list of other relevant legislation applicable to the Proposal.

**Table 2: Other relevant legislation applicable to the Proposal**

| Applicable legislation | Considerations |
|---|---|
| *Contaminated Land Management Act 1997* (CLM Act) (NSW) | Section 60 of the CLM Act imposes a duty on landowners to notify OEH, and potentially investigate and remediate land if contamination is above EPA guideline levels.<br>The site has not been declared under the CLM Act as being significantly contaminated (refer Section 6.8). |
| *Crown Lands Act 1987* (NSW) | The Proposal does not involve works on any crown land. |
| *Disability Discrimination Act 1992* (DDA) (Commonwealth) | The Proposal would be designed having regard to the requirements of this Act. |
| *Fisheries Management Act 1994* (NSW) | Storm water quality measures would be implemented during construction to prevent any adverse impacts to any natural watercourse.<br>The Proposal would not affect any listed threatened species, marine vegetation or involve dredging or dam works. |
| *Heritage Act 1977* (Heritage Act) (NSW) | • Sections 57 and 60 (approval) where items listed on the State Heritage Register are to be impacted.<br>• Sections 139 and 140 (permit) where relics are likely to be exposed.<br>• Section 170 notifications where items listed on a government agency Heritage and Conservation Register are to be impacted.<br>Arncliffe Railway Station is listed on the State Heritage Register, RailCorp's Section 170 Heritage and Conservation Register and the heritage schedule of the Rockdale LEP.<br>The Proposal aims to ensure equitable access outcomes are achieved in a way that conserves important heritage values and minimises impacts on heritage significance. A Section 60 approval would be required prior to any works proceeding.<br>The heritage assessment indicated that there was a low risk of disturbance to potential historical archaeological remains; as such no approval under Section 139 is required. However if archaeological artefacts are uncovered during construction, all work in the immediate vicinity of the find would cease and appropriate advice sought. |
| *National Parks and Wildlife Act 1974* (NPW Act) (NSW) | Sections 86, 87 and 90 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).<br>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. |
| *Noxious Weeds Act 1993* (NSW) | One noxious weed species, Lantana, was observed on the Proposal site during ecological investigations. Appropriate management methods would be implemented during construction (refer Section 6.7). |

| Applicable legislation | Considerations |
|---|---|
| *Protection of the Environment Operations Act 1997* (PoEO Act) (NSW) | 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 of the PoEO Act, Transport for NSW 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 Contractor. |
| *Roads Act 1993* (Roads Act) (NSW) | 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.<br>The Proposal would involve works on Firth Street which is not a classified road. No approvals under the Roads Act would be required however works would be undertaken in consultation with Rockdale City Council. |
| *Sydney Water Act 1994* (NSW) | The Proposal would not involve discharge of wastewater to the sewer. |
| *Threatened Species Conservation Act 1995* (TSC Act) (NSW) | 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) |
| *Waste Avoidance and Resource Recovery Act 2001* (WARR Act) (NSW) | Transport for NSW would carry out the Proposal having regard to the requirements of the WARR Act. A site specific Waste Management Plan would be prepared. |
| *Water Management Act 2000* (NSW) | The Proposal would not involve any water use, water management works, drainage or flood works, controlled activities or aquifer interference. |

## 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 Part 5 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 5.2 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 No 14 – Coastal Wetlands* or *State Environmental Planning Policy No 26 – Littoral Rainforest* applies. The Proposal does not require consideration under these SEPPs and therefore no further consideration is made 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.

In accordance with Clause 7(1) of SEPP 55, a consent authority must not consent to the carrying out of development on any land unless:

> *'(a) it has considered whether the land is contaminated.*
>
> *(b) if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or would be suitable, after remediation) for the purpose for which the development is proposed to be carried out.*
>
> *(c) if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land would be remediated before the land is used for that purpose.'*

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.

## 4.4. Local environmental planning instruments and development controls

The Proposal is located within the Rockdale LGA. The operation of the Infrastructure SEPP means that the Local Environmental Plan (LEP) does not apply. However, during the preparation of this REF, the provisions of the *Rockdale Local Environmental Plan 2011* (Rockdale LEP) were considered.

### 4.4.1. Rockdale Local Environmental Plan 2011

The Rockdale LEP is the governing plan for the Rockdale LGA, including the suburb of Arncliffe. Table 3 summarises the relevant aspects of the Rockdale LEP applicable to the Proposal.

Figure 5 shows the relevant section of the zoning map from the Rockdale LEP, with the indicative location of the Proposal.

**Table 3: Relevant provisions of the Rockdale LEP**

| Description | Comment |
|---|---|
| **Zoning** | The Proposal site and compound site are located on land that is zoned: |

| Description | Comment |
|---|---|
| | ▪ SP2 Infrastructure (Railway)<br>▪ B4 – Mixed Use<br>▪ R3 Medium Density Residential |
| **Zone Objectives and Development Controls** | The Proposal is in line with the objectives of the zones in which the Proposal site and compound site lie. |
| **Consent Requirements** | Development for the purposes of rail infrastructure is permissible with consent under the provisions of each of the zones. However, as the provisions of the Infrastructure SEPP prevail over the Rockdale LEP, development consent is not required. |
| **Restrictions Applying to Heritage Items** | Clause 5.10 of the Rockdale LEP provides for the protection of items, places and archaeological sites which have been identified in the Rockdale LEP as having heritage significance. Arncliffe Station is listed on the heritage schedule of the Rockdale LEP and the detailed design and construction of the Proposal would be undertaken with regard for existing heritage values. |
| **Flooding** | The Proposal site is not located on land that is mapped as flood prone. |
| **Acid Sulfate Soils (ASS)** | Clause 6.1 of the Rockdale LEP addresses the need for developments to consider the potential impacts associated with ASS. The Proposal site is located in an area classified as Class 5 on the Rockdale LEP Acid Sulfate Soils map. This is the lowest risk category of ASS, meaning there is a low chance of encountering such soils at the Proposal site. |

### 4.4.2. Rockdale Development Control Plan 2011

The Rockdale Development Control Plan (DCP) 2011 contains detailed provisions and controls that supplement the provisions of the Rockdale LEP. A key objective of the DCP is to…"*encourage innovative design with particular emphasis on the integration of buildings and landscaped areas that contribute to the character of neighbourhoods".*

**Direction for development**

Arncliffe village is not specifically identified in the DCP. However, the DCP provides objectives for urban design in the LGA, including the following which are relevant to the Proposal:

- ensure that all aspects of development within the City are of a high design quality, creating a more attractive and liveable urban environment
- improve the City's sustainable transport network to encourage alternative transport modes and provide better access to the City's attractions.

The Proposal would be consistent with these objectives as it would provide a much needed upgrade to Arncliffe Station, providing easy access for all users, including people with a disability, as well as people with prams or heavy luggage. The modern, clean design would provide an upgrade to the image of the station while maintaining the heritage values of the station precinct, improving safety and amenity, and providing shelter from the weather. The upgraded interchange facilities on Firth Street would improve access to bus, taxi and kiss and ride zones. Bicycle racks at both station entrances would provide improved facilities for bicycle users to access the transport system.

### Tree preservation

Section 4.1.7 of the Rockdale DCP provides requirements (and exemptions) to undertake tree work including removing, pruning, cutting down, lopping and ringbarking of trees. As the Proposal would be completed under Part 5 of the EP&A Act, and Transport for NSW is deemed a public authority, the Proposal would be exempt from requiring development consent from Rockdale City Council. Therefore, the Proposal is not subject to the Tree Preservation Order.

However, any tree removal, in particular the four Cypress trees on Firth Street and the Cypress tree to be removed from the commuter car park and proposed re-planting, would be undertaken in consultation with Rockdale City Council. The removal of trees would be minimised, with additional mitigation measures implemented to minimise impacts on trees to be retained (refer Section 6.7).

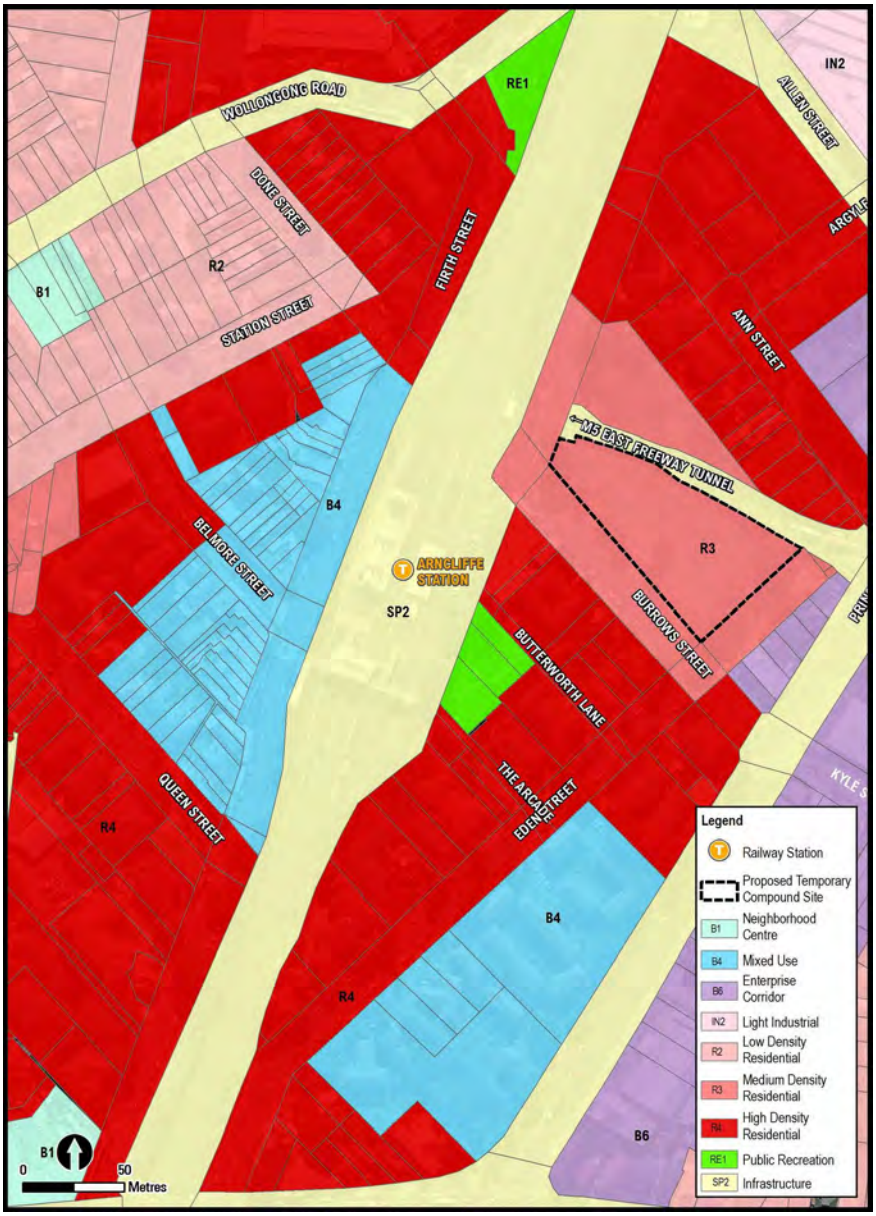



**Figure 5: Rockdale LEP 2011 zoning map**

## 4.5. NSW Government policies and strategies

In addition to statutory requirements, several NSW Government policies and strategies are relevant to the Proposal.

**State planning, infrastructure and transport plans**

The NSW Government has recently released its *A Plan for Growing Sydney* (Department of Planning and Environment, 2014) which now supersedes the *Draft Metropolitan Plan for Sydney 2036* (Department of Planning, 2010). Soon to follow will be a new delivery plan for the South Subregion which is likely to have revised housing and employment targets including for the Rockdale LGA, although with similar increasing growth trends over the coming decades.

The Proposal would support the goals and principles contained in the Plan including:

- *Principle 1: Increasing housing choice around all centres through urban renewal in established areas* – increasing housing choice close to centres and stations makes it easier to walk or cycle to shops or services; travel to work or other centres; reduces traffic congestion; and makes our neighbourhoods more community oriented.
- *Principle 2: Stronger economic development in strategic centres and transport gateways* – Sydney's largest and most important hubs for business and employment are 'strategic centres' and Sydney's 'transport gateways'. Together these locations account for 43 per cent of all jobs across Sydney.
- *Principle 3: Connecting centres with a networked transport system* – the public transport network connects people to centres. In doing this, it connects people to jobs, education facilities, health centres and hospitals, and sporting, cultural and entertainment facilities.

The proposed Arncliffe Station Upgrade is also consistent with the NSW Government's commitment to deliver an efficient and effective transport system around Sydney and NSW as detailed in *NSW 2021 – A Plan to Make NSW Number One* (Department of Premier and Cabinet, 2011). *NSW 2021* is the NSW Government's ten year plan to guide budget and decision making in NSW. NSW 2021 includes the following goals, targets and priority actions relevant to the Proposal:

- reduce travel times
- minimise public transport waiting times for customers
- improve co-ordination and integration between transport modes
- grow patronage on public transport
- improve public transport reliability
- improve customer experience with transport services.

Also relevant are the NSW Government's *Long Term Transport Master Plan* and *Rebuilding NSW – State Infrastructure Strategy.* The *Long Term Transport Master Plan* provides a clear direction for transport over the next 20 years, while building on current commitments (Transport for NSW, 2012a). The plan complements and builds on the visions and goals established in *NSW 2021* and the Proposal would support growth and improvements in the safe and efficient management of transport in the Sydney region.

*Rebuilding NSW - State Infrastructure Strategy 2014* is a plan to deliver $20 billion in new productive infrastructure to sustain productivity growth in our major centres and regional

communities (NSW Government, 2014). Rebuilding NSW will support overall population growth in Sydney and NSW.

The *Disability Action Plan 2012-17* (Transport for NSW, 2012c) was developed by Transport for NSW in consultation with the Accessible Transport Advisory Committee, which is made up of representatives from peak disability and ageing organisations within NSW. The Disability Action Plan discusses the challenges, the achievements to date, the considerable undertaking that is required to finish the job, and provides a solid and practical foundation for future progress over the next five years. The Proposal has been developed in consideration of the objectives outlined in this Plan.

*Sydney's Walking Future* (Transport for NSW 2013b) outlines the NSW government's efforts to promote walking for transport and connect people to places through safe walking networks around activity centres and public transport interchanges. The Proposal would facilitate walking by removing physical barriers to accessible public transport and by providing accessible cross-corridor access, hence contributing a relative reduction in local trips via private cars.

*Sydney's Cycling Future* (Transport for NSW 2013c) outlines the NSW government's commitment to a safe and connected network of bicycle paths as an important part of Sydney's integrated transport system. The government wants to make bicycle riding a convenient and enjoyable option by improving access to towns and centres, and investing in bicycle facilities at transport hubs. The Proposal supports the government's 'Bike and Ride' initiative that better integrates bicycle riding with other modes of transport, making it convenient to ride to transport hubs, park bicycles securely and transfer to public transport as part of longer transport journeys.

**Rockdale precinct and local strategic planning**

Rockdale City Council has prepared the *Rockdale City Urban Strategy 2010* which provides the basis for the future direction and planning of the City's urban and natural environment. It identifies the planning priorities which will be the focus of future planning aimed at improving the quality and character of the City.

One of the key priorities is to improve the City's sustainable transport network to encourage alternative transport modes and provide better access to the City's attractions. The strategy aims to double the number of walking and cycling trips by 2025 (Rockdale City Council, 2010). The Proposal is consistent with the Strategy as it would provide improved accessibility for all pedestrians, both across the railway line and to rail services and improved station facilities, including bicycle racks on both sides of the station.

Lastly, Arncliffe has been identified by DP&E as a 'Priority Precinct' after Rockdale City Council nominated the Princes Highway corridor at Arncliffe as a priority precinct following a study into the renewal of the Princes Highway corridor around Arncliffe and Banksia train stations. The purpose of Priority Precincts is to deliver more homes in places with access to infrastructure, transport services and jobs. The benefits to the community include greater housing choices, increased amenities, services and improved public spaces.

The Arncliffe precinct consists of the walking catchment around the station. Planning for the precinct is in the early investigation stage, and draft plans are expected to be released for public exhibition later in 2015. The draft plans will be supported by specialist reports, such as a transport study. The Proposal is consistent with the objectives of the DP&E and Rockdale City Council as it would provide an improved railway station and interchange which allows greater accessibility to the community.

## 4.6. Ecologically sustainable development

Transport for NSW is committed to ensuring that its projects are implemented in a manner that is consistent with the principles of 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 Transport for NSW throughout the development and assessment of the Arncliffe Station Upgrade. Section 3.1.4 summarises how ESD would be incorporated in the design development of the Proposal. Section 6.13 includes an assessment of the Proposal on climate change and sustainability, and Section 7.2 lists mitigation measures to ensure ESD principles are incorporated during the construction phase of the Proposal.

# 5. Community and stakeholder consultation

This chapter discusses the consultation strategy adopted for the Proposal and the results of consultation with the community, relevant government agencies and stakeholders, along with consultation proposed for the future.

## 5.1. Stakeholder consultation during concept design

As part of the development of the concept design, Transport for NSW consulted with Sydney Trains, the Heritage Division of OEH, Roads and Maritime Services and Rockdale City Council.

**Sydney Trains**

Sydney Trains has been consulted via the Station Working Group meetings and the Regional Configuration Control Board meeting (12 November 2014) to discuss the design of the station and interchange and the potential impacts to station operations. Detailed system functional requirements have been developed in consultation with relevant Sydney Trains stakeholders and incorporated into the design.

Sydney Trains Heritage has provided landowner's consent to progress Transport for NSW's Section 60 application with Heritage Division.

**Heritage Division**

Transport for NSW met with the Heritage Division, OEH on 24 July 2014 and 12 December 2014 to discuss the Proposal. Plans and 3D visualisations were provided to the Heritage Division.

**Rockdale City Council**

An initial meeting was held with Rockdale City Council on 19 September 2014 regarding the Proposal. The Council were provided with an overview of the options for the Proposal and that the preparation of an REF for the preferred option was underway. Transport for NSW held additional meetings with Council on 10 December 2014 and 27 January and 4 February 2015. Council was also informed that they would be formally invited to provide comments on the Proposal and the REF.

**Roads and Maritime Services**

Consultation with Roads and Maritime Services has been undertaken regarding use of the Burrows Street site as a temporary compound and commuter car park.

## 5.2. Consultation requirements under the Infrastructure SEPP

Part 2, Division 1 of the Infrastructure SEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Clauses 13, 14, 15 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 4 provides details of consultation requirements under the Infrastructure SEPP.

**Table 4: Infrastructure SEPP consultation requirements**

| Clause 13 \| Consultation with Councils – development with impacts on council related infrastructure and services | Relevance to the Proposal |
|---|---|
| Consultation is required where the Proposal would result in:<br>• substantial impact on stormwater management services<br>• generating traffic that would place a local road system under strain<br>• involve connection to or impact on a council owned sewerage system<br>• involve connection to and substantial use of council owned water supply<br>• significantly disrupt pedestrian or vehicle movement<br>• involve significant excavation to a road surface or footpath for which Council has responsibility. | The Proposal would involve minor, temporary impact on council-owned footpaths and roads during construction. A new wider footpath would be constructed on Firth Street, north of the station entrance, as part of the Proposal. Consultation with Rockdale City Council has been undertaken and would continue throughout the Proposal. |
| **Clause 14 \| Consultation with Councils – development with impacts on local heritage** | **Relevance to the Proposal** |
| Where railway station works:<br>• substantially impact on local heritage item (if not also a State heritage item)<br>• substantially impact on a heritage conservation area. | Arncliffe Station is listed on the heritage schedule of the Rockdale LEP. Consultation with Rockdale City Council has been undertaken regarding the proposed works and would continue through the next stages of the Proposal. |
| **Clause 15 \| Consultation with Councils – development with impacts on flood liable land** | **Relevance to the Proposal** |
| Where railway station works:<br>• 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 has been identified as being flood liable land.<br>Consultation with Rockdale City Council is not required under this clause. |
| **Clause 16 \| Consultation with public authorities other than Councils** | **Relevance to the Proposal** |
| Where development is undertaken adjacent to land reserved under the *National Parks and Wildlife Act 1974*, OEH and other agencies specified by the Infrastructure SEPP where relevant.<br>Although not a specific Infrastructure SEPP requirement, other agencies Transport for NSW may consult with could include:<br>• Roads and Maritime Services<br>• Sydney Trains<br>• OEH. | Consultation with other public authorities as specified in this clause is not required. However consultation with Sydney Trains would be ongoing through the next stages of the Proposal. Roads and Maritime Services would be consulted as part of the arrangements for the Burrows Street compound. |

## 5.3. Consultation strategy

Ensuring the community and key stakeholders are fully informed and given the opportunity to provide feedback during the planning process is fundamental to the success of a project.

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

The objectives of the consultation strategy are to:

- provide accurate and timely information about the Proposal and REF process to relevant stakeholders
- raise awareness of the various components of the Proposal and the specialist environmental investigations
- ensure that the directly impacted community are aware of the REF and consulted where appropriate
- 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
- build positive relations with identified community stakeholders
- ensure a comprehensive and transparent approach.

## 5.4. Public display

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

- public display of the REF at three locations
- distribution of a project update newsletter up to a radius of approximately 1,000 metres to the station to local community and rail customers, where appropriate, outlining the Proposal and inviting feedback on the REF
- advertisement of REF public display in the local newspapers (St George and Sutherland Shire Leader) with a link to the Transport for NSW website that includes a summary of the Proposal and information on how to provide feedback
- posters at the station advising that the REF is on display, including a link to the Transport for NSW website
- consultation with Rockdale City Council, Sydney Trains, Roads and Maritime Services, Heritage Division and other non-community stakeholders
- door knocks and one-on-one discussions with local businesses along Firth Street and Burrows Street
- NSW Government Have Your Say website.

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

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

1. Arncliffe Library, 11 Firth Street, Arncliffe
2. Rockdale City Council, 2 Bryant Street, Rockdale
3. Transport for NSW Information Centre, Ground Floor, 388 George Street, Sydney.

The REF would also be available on the Transport for NSW website: www.transport.nsw.gov.au/projects. Information on the Proposal would be available through the Project Infoline (1800 684 490), by email (projects@transport.nsw.gov.au) and on the Have Your Say website (haveyoursay.nsw.gov.au).

During the public display period feedback from the community is invited. Following consideration of feedback received during the public display period, Transport for NSW would determine whether to proceed with the Proposal and what conditions would be imposed on the project should it be determined to proceed.

## 5.5. Aboriginal community involvement

An Aboriginal Heritage Inventory Management System (AHIMS) search was undertaken for the area covered by the Proposal and the area around Arncliffe Station on 7 October 2014. No Aboriginal sites are recorded in or near the location, and no Aboriginal places have been declared in or near the location.

The extensive landscape modification that has occurred across the study area suggests that intact evidence of Aboriginal land use is unlikely to occur within the study area boundaries. Similarly, the high level of disturbance would suggest that the archaeological potential of the area is low. Therefore it was not considered necessary to undertake specific Aboriginal consultation.

## 5.6. Ongoing consultation

At the conclusion of the public display period for this REF, Transport for NSW would acknowledge receipt of feedback from each respective respondent. The issues raised by the respondents would be considered by Transport for NSW before determining whether to proceed with the Proposal (refer Figure 1, page 13).

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

Should Transport for NSW determine to proceed with the Proposal, the project team would keep the community, Rockdale City 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 Plan by the Contractor 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 2.

## 6.1. Traffic and transport

### 6.1.1. Existing environment

Arncliffe Station is located on the T4 Eastern Suburbs and Illawarra Line, south of the Sydney CBD. The station is serviced by six trains per hour (in both directions) during the morning and afternoon peaks with less frequent services provided outside of the peak periods.

There are three points of access to the station:

- via a footpath from the commuter car park on the eastern side of the station
- via a footpath from Butterworth Lane connecting to a long footpath situated between residential buildings and thick vegetation, known locally as ‘the arcade’, extending to Eden Street on the eastern side of the station
- via Firth Street from the western side.

Access to station platforms and across the railway line is via stairs and a pedestrian footbridge, and does not currently allow for a DDA compliant path of travel.

A previous survey of morning peak passengers at Arncliffe Station suggests that walking is the predominant mode of access to the station, followed by informal kiss and ride and park and ride (SKM, 2013). The survey also noted that the Arncliffe Station footbridge provides an opportunity for pedestrians to cross the railway line to access other destinations.

In the morning peak, 71 per cent of pedestrian access to Arncliffe Station is from the western side of the station with the remaining 29 per cent from the eastern side. Key pedestrian desire lines include Belmore Street and Firth Street to the western entrance and Burrows Street and the ‘arcade’ to the eastern entrance (SKM, 2013).

There are currently no dedicated bicycle lanes to the station on either side however potential on-road cycle routes to the station include travel along Arncliffe Street, Burrows Street and Eden Street on the eastern side of the station. A bicycle rack is currently provided on the eastern side of the station. There are no bicycle facilities on the western side of the station.

There is one bus stop (with two sheltered seats) located next to the western entrance of the station on Firth Street. Bus connections are provided by Sydney Bus service 473 (Rockdale to Campsie) which operates hourly all day and half hourly in the peaks from 6.30 am to 9am. Arncliffe is also served by two Night Ride bus routes:

- N10 between Sutherland and Town Hall
- N11 between Cronulla and Town Hall.

The commuter car park currently provides approximately 30 spaces. Additional parking is provided on Burrows Street. Timed, parallel parking is provided on both sides of Firth Street in the vicinity of the station. On-site observations during peak hour indicated that there is sufficient parking available to the east of the station, with many vacant parking spaces. There is currently no accessible parking near the station.

There is no formal kiss and ride or taxi zone at the station.

Vehicle access to Arncliffe Station is primarily via Belmore Street and Firth Street to the west of the station and Burrows Street and Eden Street to the east. The Princes Highway runs parallel to the railway line, approximately 200 metres to the east, and serves as a major access point for local employment activities connecting to streets that service the station. The M5 motorway tunnel is located below the northern end of the Arncliffe Station platforms.

### 6.1.2. Potential impacts

#### (a) Construction phase

**Pedestrian and road access to Arncliffe Station**

During construction of the Proposal, pedestrians would continue to access the station platform via the existing footbridge and stairs. Impacts to pedestrians during construction of the Proposal may occur as a result of the following activities:

- short-term closures of the footpath on Firth Street (southbound) to enable the footpath widening, construction of the new shelters and vehicle bay for the bus stop, and new taxi/kiss and ride zone
- short-term closure of the footpath connecting the commuter car park to the eastern station entrance to enable a new DDA compliant footpath to the lifts to be constructed
- short-term works to upgrade the stairs from the footbridge to the street at both the eastern and western entrances to the station
- temporary weekend closures of Arncliffe Station to construct new lifts, concourse extension and canopy installation with a temporary shuttle bus in operation
- temporary closure of the southbound lane of Firth Street during construction of new vehicle bay for new bus stop, new taxi/kiss and ride area.

Activities would be staged so that much of the works likely to impact on pedestrian movement would be undertaken during night periods, outside of peak train travel periods, or during possessions.

It is anticipated that, to the greatest extent possible, pedestrian access to and across the pedestrian footbridge would be maintained during track possessions. Clearly identified alternative routes would be designated for the short periods when it is not possible to maintain through access.

The commuter car park would be closed for the duration of construction to allow for:

- the use of the site as a secondary construction compound and for materials to be delivered safely and stored close to the site
- the safety of customers and staff

- construction vehicles to enter and exit the site, negating pedestrian and motorist interface with construction vehicles
- the construction of the lift shafts on the eastern side of the station and the accessible car parking spaces.

The Construction Traffic Management Plan (CTMP) would include designated safe pedestrian access routes for each stage of the Proposal, and appropriate signage would be installed to facilitate safe access.

**Bus**

The southbound bus stop on Firth Street would need to be temporarily relocated to allow for construction of the widened footpath, vehicle bay for the bus stop and new taxi rank/kiss and ride zone and shelters along the eastern side of Firth Street, next to the station. This temporary bus zone could be located further north on Firth Street outside the construction zone. Arrangements for the temporary location of the bus zone would be undertaken in consultation with Sydney Buses and Rockdale City Council, and notified at the appropriate time in accordance with Sydney Buses and Transport for NSW policy.

**Taxi and kiss and ride**

Construction of the Proposal is not expected to result in any impacts on taxis or kiss and ride spaces as there are currently no formal taxi/kiss and ride arrangements in place at the station. Furthermore, there are safe stopping locations situated to the south of the station entrance that could be used while construction activities on Firth Street are being undertaken.

**Cyclists**

During construction the existing bicycle rack on the eastern side of the station would be removed prior to being reinstalled. The CTMP would identify any opportunities for short term alternative bicycle parking, prior to bicycle racks being permanently installed on both sides of the station.

**Heavy vehicles**

During construction, heavy vehicles would be required to bring building materials, precast sections, and large plant/equipment to the site and remove any waste. The number of heavy vehicles would be kept to a minimum and where practical they would operate outside the peak hours and so it is anticipated that there would be negligible impact on existing traffic conditions. It is expected that, to the greatest extent possible, heavy vehicle access would be on the eastern side of the station, using the commuter car park compound off Arncliffe Street for deliveries and storage. Some heavy vehicles and a crane would be required on Firth Street during the upgrade of the interchange and to lift materials into the station.

The CTMP would identify any required traffic controls and turning movements of heavy vehicles as well as standing locations. Construction traffic/haulage routes would be identified within the CTMP and would be dependent on the contractor chosen for construction and the relevant authorities such as Rockdale City Council and Roads and Maritime Services, and the location of their source material. Heavy vehicle movements along Firth Street and through the Arncliffe town centre would be kept to a minimum.

**Parking**

The commuter car park which has capacity for approximately 30 parking spaces would be closed for the duration of construction for the safety of customers and staff. The closure of

the commuter car park would allow for construction vehicles to enter and exit, negating pedestrian and motorist interface with construction vehicles. The closure would also allow for the site to be used as a secondary construction compound and for materials to be delivered safely and stored close to the site. Construction of the lift shafts on the eastern side of the station and the accessible car parking spaces in this area would also require the car park to be closed.

Alternate commuter parking would be provided on part of the Roads and Maritime Services owned land off Burrows Street (Burrows Street compound) about 40 metres from the northern end of the existing car park. As a result, commuters would be required to walk further to and from the station each day (approximately 160 metres from the car park to the station compared with 40-120 metres from the existing commuter car park). The car park is also likely to be used by patrons of the Scots Club, although the distance from the replacement parking area would be shorter to this location. Lighting, signage and traffic control measures would be used to assist customers accessing the station. Additional commuter parking is available further along Burrows Street and other local roads, which would likely meet the short-term demands for commuter and local parking in the area.

Once work commences on the street upgrades on the southbound side of Firth Street, parking spaces along that side of the street to the north of the station would not be available. Parking would be reinstated during operation, although there is potential for two parking spaces to be permanently removed.

**Construction workforce parking and traffic**

In order to minimise the impacts on commuters and residents in the vicinity of Arncliffe Station, construction workers would park in the Burrows Street compound rather than parking in the town centre or in the replacement commuter car parking area in the Burrows Street compound. The CTMP would include a Parking Plan to address construction parking for the duration of the construction period.

### (b) Operational phase

One of the key objectives for the Proposal is to provide a safe and accessible path to the station for the members of the Arncliffe community and enhance station interchange facilities to encourage greater use of public transport. The Proposal would result in the following positive operational outcomes at Arncliffe Station to achieve Proposal objectives:

- provision of four passenger lifts to improve access for people with a disability, people with prams/strollers or people with luggage
- upgraded stairs from the footbridge to the station platforms that are compliant with safety and access standards
- upgraded stairs from the footbridge to the street on each side of the station that are compliant with safety and access standards
- new canopies installed along existing footbridge, upgrade stairs and new canopy awnings on Platform 2/3 (between lifts and existing awnings) for weather protection which would also help to minimise slip hazards
- two new accessible parking spaces at the commuter car park at the closest location to an upgraded footpath leading to the eastern entrance to the station
- widened footpath on Firth Street north of the western station entrance for pedestrian access
- new designated sheltered bus bay, taxi stand and Kiss and Rise zone on Firth Street, immediately north of the western station entrance
- bicycle racks installed on both sides of the station
- two family accessible toilets installed on each island platform.

Based on the concept design:

- the proposed upgrade on Firth Street to provide a new vehicle bay for the bus stop, new taxi/kiss and ride area as well as a widened footpath, has the potential to cause the loss of two time-restricted parking spaces on the southbound (station) side of the street
- there is potential for a net loss of two to four parking spaces at the commuter car park on the eastern side of the station to allow for two accessible parking spaces and a new footpath
- the number of spaces to be permanently impacted on both sides of the station would be determined during detailed design, and minimised as far as possible. However, given there is other short term parking areas available in the town centre and long-term parking within 150 metres of the station on the eastern side, there is not expected to be a major impact on parking demand in the longer term. The Proposal would encourage the use of public transport by improving accessibility and station interchange facilities
- no additional congestion or major traffic generation is anticipated as a result of the Proposal. Signage at the new bus bay, taxi rank and kiss and ride area would be provided to assist traffic flow
- the operation of the Proposal is not expected to have any impact on existing access to properties in the vicinity.

### 6.1.3. Mitigation measures

A Construction Traffic Management Plan (CTMP) would be prepared by the Contractor in consultation with Transport for NSW, and provided to Rockdale City Council and Roads and Maritime Services for information. The CTMP would be the primary management tool to manage potential traffic impacts associated with construction. The CTMP, at a minimum, would include:

- procedures for preparing and implementing Traffic Control Plans (TCPs)
- final construction traffic approach and departure routes
- locations of access to and from the local road network and contractor parking
- a Parking Plan to consider changes to parking (e.g. alternate commuter parking to be provided at the Burrows Street compound)
- details of construction signage, traffic controllers (in particular for reversing out of the site) and other community notification
- measures to maintain customer access to and from the station at all times with the implementation of a Pedestrian Management Plan
- measures to maintain private property access unless otherwise agreed.

Refer to Table 11 for a list of proposed mitigation measures.

## 6.2. Urban design, landscape and visual amenity

A Visual Impact Assessment was undertaken for the Proposal by Iris Visual Planning & Design (2015). The assessment included desktop analysis, site inspection and creation of photomontages to provide an indication of what the Proposal may look like once complete.

### 6.2.1. Existing environment

Arncliffe Station is an important landmark and visual feature in the local landscape. The visual significance of the station is reflected in its listing on the State Heritage Register as an example of railway station architecture spanning 1884 to 1925. Areas to the east and west of this corridor are characterised by a mix of historic and modern residential and commercial buildings. The existing visual conditions of the Proposal and surrounds are described in the following sections (refer also to

).

**Arncliffe Station precinct**

Arncliffe Station is characterised by the distinctive Victorian style red brickwork platform buildings and decorative cast iron columns and brackets. It is a local landmark and “one of the best examples of suburban station architecture from the first period of construction on the Illawarra line” (NSW State Heritage Register, 2012).

The steel footbridge and stairs and the overhead booking office are also considered to be good representative examples of their types. The hipped and gabled corrugated steel roofline of the booking office provides a unique visual feature in the local landscape. The “topiary shrub plantings on both island platforms” are also notable landscape features listed on the State Heritage Register.

The rail corridor includes numerous overhead poles and wires and corridor security fencing which create some visual clutter, particularly to the north of the station.

**Firth Street and the Arncliffe town centre**

To the west of the station, Firth Street runs parallel to the railway corridor and is characterised by early twentieth century two-storey commercial buildings with on street parallel parking. The station buildings on Platforms 1 and 2 are just below street level, allowing a visual connection between Firth Street and Arncliffe Station through the existing Cypress trees on Firth Street.

In the vicinity of the station the streetscape is characterised by a row of mature Cypress trees which are located between the rail corridor and Firth Street. This distinctive grouping of trees is a local visual feature and a landmark associated with views to the station in this area. The spacing of these trees frames views to the historic station platform buildings, and creates a distinctive character to this part of Firth Street. These trees are included in the streetscape area listed as a heritage item in the Rockdale LEP, however the mature Fig, Brushbox and Camphor Laurel trees to the south of the station (although not specified) are considered to be the primary contributory elements of the Street Plantings listing (not the Cypress trees immediately opposite Platform 1/2).

The landform rises sharply to the west of Firth Street, and includes five to six storey brick residential units. These residences would have views over the Arncliffe Station and Proposal site.

**Forest Road and upper Firth Street**

The landform rises south from Arncliffe Station up to Forest Road, where there is a collection of historic buildings along upper Firth Street and Forest Road. At this point the rail corridor comprises steep embankments stabilised by concrete, steel reinforcements and vegetation, providing channelled views from nearby roads (Firth Street, Forest Road, and upper Eden Street), footpaths and residences to the heritage concourse building and footbridge.

In particular, the Victorian red brick rail bridge at Forest Road provides elevated northerly views along the rail corridor to Arncliffe Station and beyond to the Sydney CBD. This bridge is included in the station's State Heritage Listing and is identified as a landmark in the Rockdale DCP. The DCP requires that ' *view corridors to landmarks and significant heritage items must be protected where possible'* . It also identifies this view specifically as a 'City View', which reflects its local importance.

**Residential areas to the east of Arncliffe Station**

A neighbourhood park, commuter car park, and sports club are located adjacent to the eastern station entrance. This area includes a mature framework of trees including a number of large Brushbox trees and one Cypress tree within the commuter car park. There is also a footpath leading alongside the commuter car park to Arncliffe Street.

The neighbourhood park includes a number of shade trees and a small playground and has open views to the station buildings. A laneway ('the arcade') leads from the station to Eden Street.

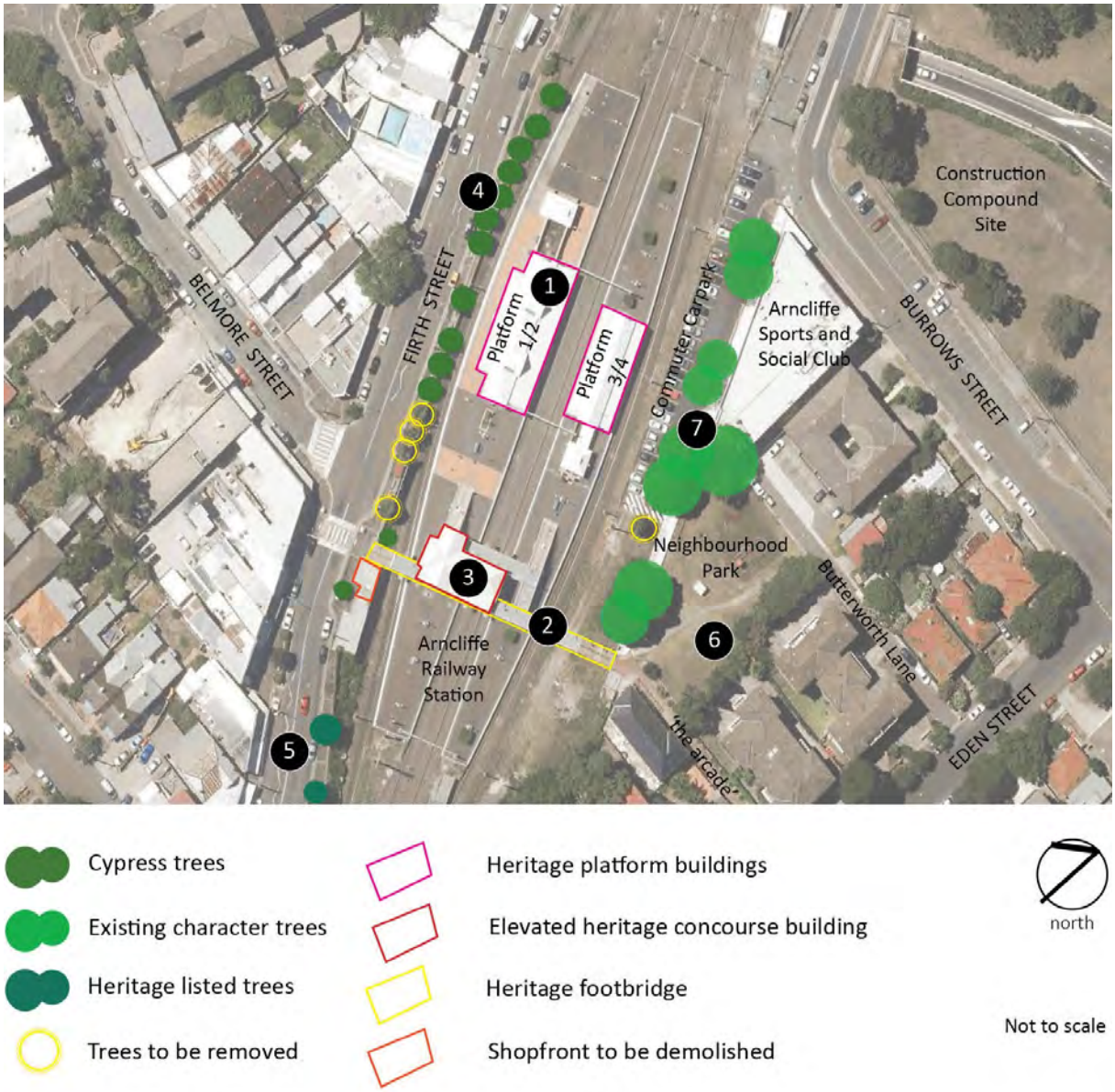
To the east of the station is a predominantly residential area, centred on Eden Street, which includes a mix of medium density residential units and low density detached and semi-detached houses on leafy streets. Adjacent to the railway corridor, residential units overlook the station, filtered through mature trees.

North of the station, the mature vegetation along the rail embankment is a strong visual feature in the landscape and encloses views to the rail corridor.

Views to Arncliffe Station are relatively open from this location, viewed across commuter car parking. The historic station platform buildings are visible but not prominent in views from this area.

**Night environment**

At night, the Proposal is considered to be of moderate district brightness, with the existing roads, station and railway corridor, and residential development creating a moderately well-lit environment at night.




KEY:
1. State Heritage listed platform buildings
2. State Heritage listed footbridge
3. State Heritage listed elevated concourse building (Booking office)
4. Row of Cypress trees
5. Heritage item, street plantings along Firth Street (Rockdale LEP)
6. Neighbourhood Park on Butterworth Lane
7. Brushbox trees (*Lophostemon confertus*) and Cypress trees within commuter car park

**Figure 6: Landscape and visual features of the site (Iris, 2015)**


**Figure 7: Viewpoint location plan (Iris, 2015)**

### 6.2.2. Potential impacts

The Visual Impact Assessment considered potential visual impacts during construction and operation from nine viewpoints (refer Figure 7 ) and the assessment is summarised in this section and in Table 5. An artist impression of what the Proposal may look like once complete has also been prepared for the Proposal (refer Figure 8).

**Views from the station**

Viewpoint 1

Due to the close proximity of the construction works at this location, and the extent of construction works likely to be visible, it is expected that the Proposal would cause a considerable reduction in the amenity of views from the station platforms in the short term. Views from within the station are considered to be of regional visual sensitivity due to the State Heritage listing of the platform buildings and the importance of these buildings in views from the station to the wider community. Because of this visual sensitivity, the proposed change would result in a high adverse visual impact during construction.

During operation, new elements of the Proposal would be largely 'hidden' behind the existing 1920s elevated concourse building and the architecture of the new lift structures and new bridging structure has been designed to be visually separate and subservient to the historic structure. The new structure would rise above the existing footbridge, but not exceed the height of the concourse building roof.

The new canopy awnings located on each platform would add visual clutter to the station environment, be prominent in this view, and partially obstruct views between the elevated station concourse building and the platform. As such, the visual impact at this viewpoint has been assessed as moderate adverse.

In views from the southern areas of the platform, the Proposal would obstruct views to the rear of the elevated concourse building. Glimpses to the historic platform buildings would remain. In these views the Proposal would be seen as a contemporary structure, visually separate to the heritage buildings. Deflection walls, located at the base of the structure, would partly enclose views from the station platform to the adjacent forecourt areas, Firth Street in the west, parkland and residential areas to the west. These walls would not rise above the height of trains at the station and would be seen as an integral part of the new structure.

**Views from Firth Street and the Arncliffe town centre**

Viewpoints 2 and 3

Due to the construction activity that would be seen on Firth Street, there would be a noticeable reduction in visual amenity during this time from Viewpoints 2 and 3. This would result in a temporary moderate adverse visual impact during construction.

In views from Firth Street during operation, new elements would be largely screened by the existing Cypress trees which line the western edge of the station with some glimpses through the trees to the station platform canopies. The station entrance would be more visually prominent with the lift structure and ID signage located at the Firth Street entrance to the station. Up to four Cypress trees would be removed from Firth Street, immediately north of the station entrance. A forecourt would be created at the station entry with new trees and paving. Streetscape improvements would also be seen on Firth Street, in the middle ground of views from Firth Street, including a widened footpath and additional street trees. Although

the new station entry and station identification signage would be seen prominently in views, as most of the Cypress trees would be retained along Firth Street, and those which will be removed would be replaced with new trees and an improved forecourt area, these changes would result in no perceived change in the amenity of views from this location (refer Viewpoint 2). As such the visual impact from this Viewpoint has been assessed as negligible.

In views from Belmore Street, the new western entry to the station would be visually prominent in the centre of the view, directed and framed by the urban form of the streetscape. The new elements would be visually separate from the heritage architecture, compatible with the surrounding urban environment, and be more visually prominent, improving the legibility of the station entry. It is therefore expected that the Proposal would create a noticeable improvement in the amenity of these views, resulting in a minor beneficial visual impact during operations.

There may be private views to the Proposal site from residential units in elevated areas. The Rockdale DCP permits increased density in the town centre and development to a height of 14.5 metres of which the Proposal would be consistent, and the proposed design would ensure new elements are visually subservient to the existing architecture. Therefore, it is considered that there would be negligible to minor adverse impacts.

Viewpoints 4 and 5

Due to the construction activity that would be seen in the centre of the view, there would be a considerable reduction in visual amenity appreciated during this time. This would result in a moderate adverse visual impact during construction.

Views north from the upper areas of Firth Street are framed by commercial and retail buildings to the west and mature vegetation along the rail corridor to the east. There are open views to the rear elevation of the heritage listed elevated station concourse building and footbridge which span the rail corridor (refer Viewpoints 4 and 5). The four new lift shafts and new bridging structure would be seen on the southern side of the existing concourse building, obstructing views to the heritage concourse building, but not rising above the hipped roofline. As the Proposal would obstruct the heritage architecture, it is expected that the Proposal would result in a noticeable change in the amenity of views, resulting in a minor adverse visual impact during operations.

**View from Forest Road bridge**

Viewpoint 6

Due to the demolition and construction activity that would obstruct views to the historic elevated concourse building, there would be a noticeable reduction in visual amenity of the view during construction resulting in a moderate adverse visual impact during construction because of the regional sensitivity of this view.

The view from the Forest Road bridge is identified in the Rockdale DCP as a ‘city view’ and important as it links two heritage items. This view is an unobstructed view with the station in the background, and with the Sydney CBD skyline in the distance. From this location, two platform lift shafts and new bridging structure would be clearly visible on the southern side of the historic elevated concourse building, obstructing views to the historic elevated concourse building (refer Viewpoint 6). Furthermore, it is expected that the Proposal would result in a noticeable reduction in the amenity of the view from the Forest Road bridge due to the obstruction of the heritage concourse building resulting in a minor adverse visual impact during operations.

### Views from areas to the east of the station

Viewpoint 7

During construction, it is expected that the works and compounds would be visible, but would not comprise a large portion of the view. As a result there would not be a noticeable change in the amenity of these views, resulting in a negligible visual impact during construction.

From this location the new station entrance signage, the new eastern entry lift shaft, and the new bridging structure would be seen, located to the south of the stairs and existing elevated concourse buildings. The improved presence of the station entry would result in a noticeable improvement in visual amenity of the view along 'the arcade'. This would result in a minor beneficial visual impact.

In views from the commuter car park a new landscaped entry and new station entrance signage would improve the character of the station precinct. The eastern entry lift shaft and new bridging structure would be located to the south of the elevated concourse building. These elements would be seen rising above the historic footbridge, but remaining below the roofline of the historic elevated concourse building. The station identification signage would be located on the elevated concourse building and would be visually prominent. Works to the station platforms would also be seen including minor modifications to the historic station platform buildings, and awnings which would be located between the platform buildings and stairs.

Viewpoint 8

During construction, a construction site would be visible at the site of the eastern station entrance and across the commuter car park. This work would comprise a large extent of the view and would be seen prominently in the view. In addition, due to the scale and proximity of works, there would be a noticeable reduction in visual amenity of the view during this time. This would result in a minor adverse visual impact during construction.

From this location, the two platform lift shafts, western entry lift shaft and new bridging structure would be located beyond the existing elevated concourse buildings and largely hidden. The new eastern station entrance, lift shaft, and new entrance connecting to the commuter car park, would be seen prominently in the view. A mature Cypress tree would be removed to accommodate upgrades to the car park and a new eastern forecourt area with trees and garden areas may be glimpsed through existing trees within the park.

During operation, the Proposal would result in no perceived change in the amenity of the view as although the works are in close proximity to the view and take up a large portion of the view, the architecture of the works would be visually separate and subservient to the heritage architecture. This would result in a negligible visual impact during operation.

In views from residential areas to the east of the site there is likely to be a considerable alteration of views where the southern elevation of the elevated concourse building is visible. The station architecture is generally in character with the scale and massing of structures at a station, and therefore the contrast would not be great. Generally, in views from these areas, there would be a minor adverse visual impact during construction and a negligible visual impact during operations due to the neighbourhood visual sensitivity of these views.

### Views at night

During construction, the Proposal site and adjacent construction set down areas would be lit for security and additional lighting would also be utilised during rail possession periods for scheduled work outside standard hours.

During operation, the upgraded station would be appropriately lit for security and safe use at night. The station would be seen in context with the existing station lighting, commercial buildings and street lights along Firth and Burrows Streets. It is expected that there would, however, be additional sky glow created and some potential for obtrusive light impacts on residential properties to the east of the site. Alterations to the view would be noticeable and result in negligible to minor adverse visual impacts during construction and operation.


Note: Image is indicative only. Subject to detailed design.

**Figure 8: Artist impression of the Proposal – view from platform looking north**

**Table 5: Visual Impact Assessment (Iris, 2015)**

| | | | Construction | | Operation | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Day | | Day | | Night | |
| Viewpoint Number and Location | | Visual Sensitivity | Visual Modification | Visual Impact | Visual Modification | Visual Impact | Visual Modification | Visual Impact |
| 1 | View from Arncliffe Station platform | Regional | Considerable reduction | High adverse | Noticeable change | Moderate adverse | No perceived change | Negligible |
| 2 | View south from Firth Street | Local | Noticeable reduction | Minor adverse | No perceived change | Negligible | No perceived change | Negligible |
| 3 | View east along Belmore Street | Local | Noticeable reduction | Minor adverse | Noticeable improvement | Minor benefit | No perceived change | Negligible |
| 4 | View north along Firth Street | Local | Considerable reduction | Moderate adverse | Considerable reduction | Moderate adverse | No perceived change | Negligible |
| 5 | View from the Corner of Firth and Queen Streets | Local | Noticeable reduction | Minor adverse | Noticeable reduction | Minor adverse | No perceived change | Negligible |
| 6 | View north from the Forest Road bridge | Regional | Noticeable reduction | Moderate adverse | Noticeable reduction | Moderate adverse | No perceived change | Negligible |
| 7 | View from park on Butterworth Lane | Neighbourhood | Considerable reduction | Minor adverse | Noticeable reduction | Negligible | No perceived change | Negligible |
| 8 | View west along ‘the arcade’ from Eden Street | Neighbourhood | Noticeable reduction | Negligible | No perceived change | Negligible | Noticeable reduction | Negligible |
| 9 | View south from commuter car park | Local | Considerable reduction | Moderate adverse | Noticeable reduction | Minor adverse | No perceived reduction | Negligible |

### Urban design and landscape character

The Proposal is generally consistent with the design intent and strategies identified in the Rockdale DCP. Specifically, the DCP requires that new development, such as the station upgrade, *"fits into the surrounding environment and pattern of development by responding to:*

a) *urban form*

b) *local topography and landscape*

c) *view corridors*

d) *surrounding neighbourhood character and streetscape, and*

e) *the local street and pedestrian networks."*

The Proposal has an appropriate scale and form which fits into the surrounding environment, particularly with the identified increase in urban density and development height envisaged for the Arncliffe town centre in the Rockdale DCP.

Key view corridors in the local area would be generally preserved by the Proposal. With some impacts experienced on views from the Forest Road bridge to the station buildings.

The Proposal responds to the surrounding neighbourhood character and streetscape, local street and pedestrian networks. Accessibility throughout the station precinct would be enhanced by the Proposal, and there would be no adverse impacts on existing pedestrian routes or streetscapes.

The Proposal requires the removal of one Cypress tree from the commuter car park on the eastern side of the station, and up to four Cypress trees adjacent to Firth Street near to the western station entry. The removal of these trees not only has an impact on visual amenity but on the shade and comfort of the adjacent pedestrian footpath and parking areas. However, this landscape impact would be minor as numerous other trees would be retained, and additional tree planting would be provided in the vicinity.

Overshadowing of adjacent properties would be limited to the winter months, due to:

- the roughly north to south orientation of the station building
- the separation of the proposed station building from neighbouring residential and commercial areas by Firth Street, the commuter car park and neighbourhood park.

In addition, the use of semi-transparent steel mesh throw screens will reduce the depth of shadow thrown by built elements in some areas. Figure 9 and Figure 10 illustrate the overshadowing impacts of the proposed station building in winter.

The properties that would be impacted by overshadowing in winter, in the morning, are the commercial properties on Firth Street, north of the intersection with Belmore Street. In addition to these buildings, the public footpaths located adjacent to the station buildings, along Firth Street, would also experience overshadowing during winter. On winter afternoons, there would also be the potential for overshadowing on buildings adjacent to the eastern station entry, and 'the arcade'.

The legibility of the station precinct would be improved by the scale and visual prominence of the proposed station buildings on Firth Street in the west, and at the eastern entry adjacent to the park and 'the arcade'. In particular, the location of the station at the terminus of views along Belmore Street, and north and south along Firth Street would locate the station more prominently within the commercial precinct of Arncliffe.

The safety and security of the station precinct would be improved by the Proposal due to the improved provision of lighting, CCTV and other safety devices, creating a safer public realm around the station precinct.

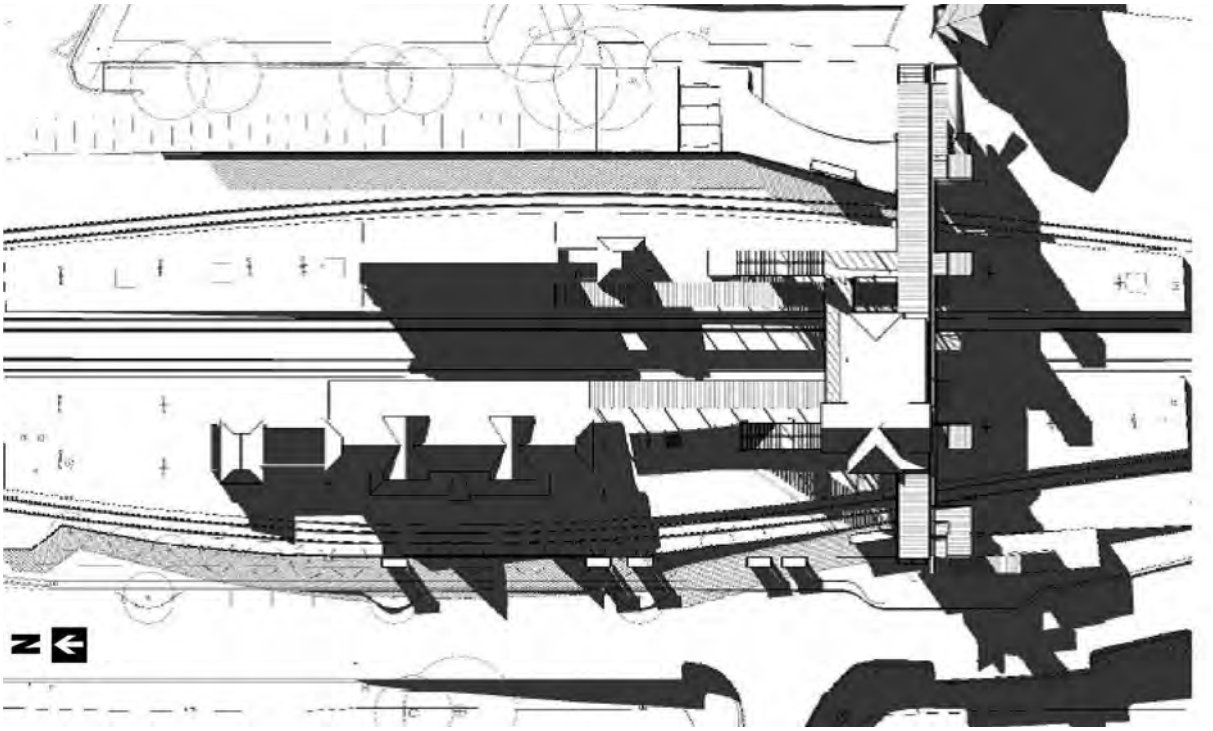


**Figure 9: Shadow diagram, winter, June 21 9am**

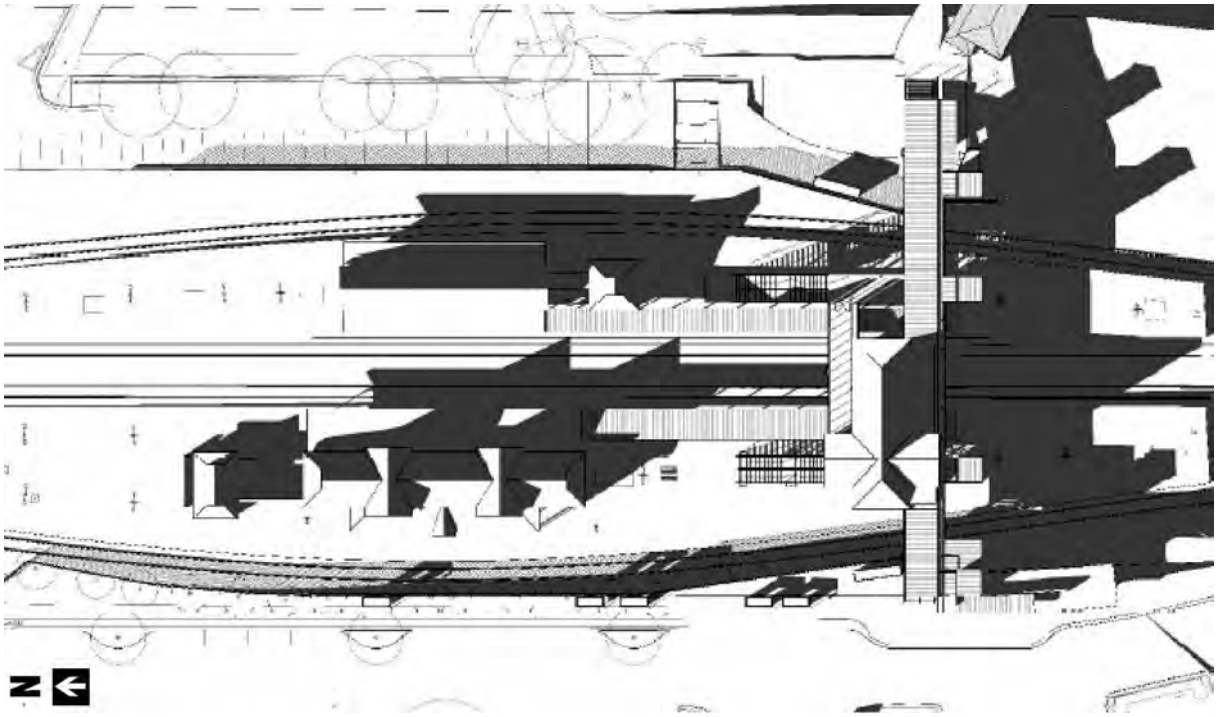


**Figure 10: Shadow diagram, winter, June 21 3pm**

### 6.2.3. Mitigation measures

Measures to mitigate visual impacts during construction would be included in a CEMP for the Proposal and would include measures such as minimising light spill during night works, screening of compounds and minimising tree removal. Refer to Table 11 for a list of proposed mitigation measures.

Visual mitigation measures should be considered further during detailed design to minimise the level of residual visual impacts, with reference to the recommendations included in the Visual Impact Assessment (Iris, 2015) which are included in the list of proposed mitigation measures in Table 11.

The measures contained in the assessment are generally aimed at reducing the extent of visual contrast between the visible portions of the Proposal structures and the surrounding landscape, and/or screening direct views toward the Proposal where possible. In addition, the detailed design would also look to incorporate contemporary light/transparent design, with modern materials and colours that are sympathetic to the existing station precinct. A reduction in the scale of the station identification signage would also be considered to ensure a balance is achieved between the legibility of the station entries and their prominence in relation to the surrounding heritage architecture.

## 6.3. Noise and vibration

An environmental Noise and Vibration Impact Assessment has been undertaken by Ausenco for the Proposal (Ausenco, 2015). The findings of the assessment are summarised in this section.

### 6.3.1. Existing environment

The existing noise environment is currently dominated by noise emissions from surrounding local road traffic, surrounding industries, train noise from the railway line and road traffic noise from Princes Highway.

There are nearby residential and commercial receivers along with a place of worship and child care centre located on nearby streets which have been categorised into six different noise catchment areas (NCA) – refer Figure 11.

To characterise the existing noise environment of the area, unattended noise monitoring was conducted between the dates of Friday 7 November and Tuesday 11 November 2014 at three noise monitoring (NM) locations shown in Figure 11. Background monitoring was not undertaken at NM4 due to instrument placement and suitability issues, and attended monitoring was undertaken at this location.The results of the noise monitoring are presented in Table 6.

**Table 6: Summary of existing ambient noise levels (Ausenco, 2015)**

| Noise Monitoring (NM) Location | Measurement Descriptor | Daytime (0700 – 1800) | Evening (1800 – 2200) | Night-time (2200 – 0700) |
|---|---|---|---|---|
| **NM1** Done Street, Arncliffe | $L_{Aeq}$ | 58 | 56 | 53 |
| | RBL | 46 | 43 | 34 |
| **NM2** Anne Street, Arncliffe | $L_{Aeq}$ | 57 | 58 | 54 |
| | RBL | 46 | 44 | 38 |
| **NM3** Eden Street, Arncliffe | $L_{Aeq}$ | 58 | 54 | 51 |
| | RBL | 45 | 44 | 37 |

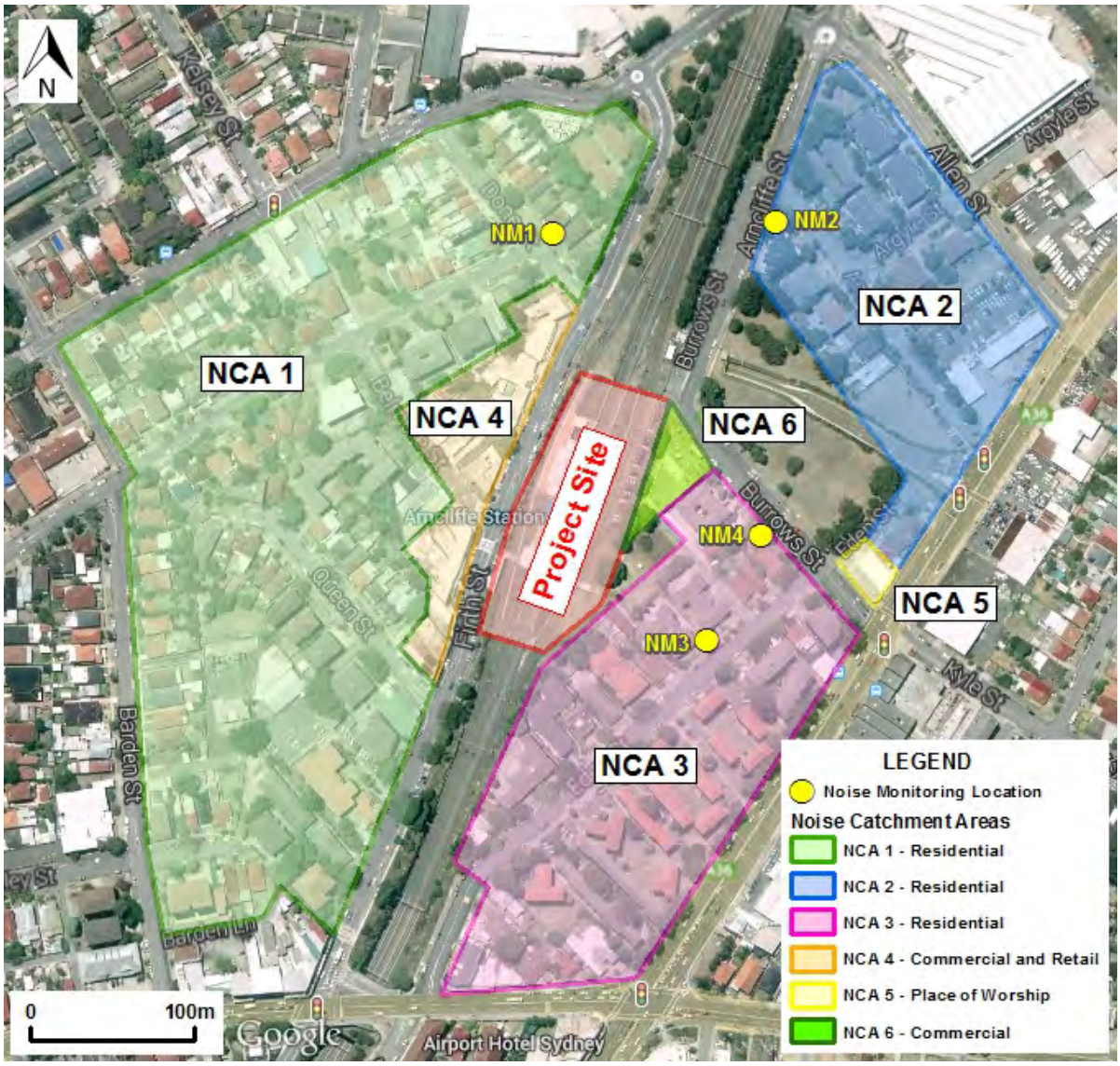



**Figure 11: Noise catchment areas and noise monitoring locations (Ausenco, 2015)**

The *Interim Construction Noise Guideline* (ICNG) (DECC, 2009a) provides management objectives for construction noise at residential and other sensitive land uses. As per the procedures outlined in the ICNG, background noise monitoring results are used to establish a rating background level (RBL), which is then used for noise assessment purposes (refer Table 6). The existing average noise level ($L_{Aeq}$) represents the average noise level over the monitoring period. The background noise level ($L_{A90}$) represents the noise level exceeded for 90 per cent of the monitoring period and is also referred to as the RBL.

The results of the noise monitoring were also utilised in accordance with the procedures contained in the *NSW Industrial Noise Policy* (INP) (EPA, 2000) to establish representative noise levels from all noise sources in the area at the residences.

### 6.3.2. Potential impacts

#### (a) Construction phase

**Noise**

*Proposal specific noise criteria*

The ICNG prescribes levels for certain receiver types such as commercial and schools, and a method for establishing noise management levels for residential receivers (RBL + 10 dbA for standard construction hours; and RBL + 5 dBA for out of hours). The 'highly noise affected' level for all residential receivers is 75 dBA. Proposal specific noise criteria (PSNC) have been developed for residential NCAs as per the procedures in the ICNG – refer Table 7.

**Table 7: Proposal specific noise criteria for residential noise catchment areas (Ausenco, 2015)**

| Location | Measurement Descriptor | Standard Hours | Out-of-Hours | | |
|---|---|---|---|---|---|
| | | Daytime (0700 – 1800) | Daytime (0700 – 1800) | Evening (1800 – 2200) | Night-time (2200 – 0700) |
| NCA 1 | RBL (Background $L_{A90}$) | 46 | 46 | 43 | 34 |
| | **Noise management level** | **56** | **51** | **48** | **39** |
| NCA2 | RBL (Background $L_{A90}$) | 46 | 46 | 44 | 38 |
| | **Noise management level** | **56** | **51** | **49** | **43** |
| NCA3 | RBL (Background $L_{A90}$) | 45 | 45 | 44 | 37 |
| | **Noise management level** | **55** | **50** | **49** | **42** |

Sleep disturbance and sleep arousal are subjective responses varying for individuals; with reference to the EPA guidance, potential for internal disturbance from construction noise is expected to be minimised where construction noise levels are within the night time RBL ($L_{A90}$) + 15 dB construction noise management levels. Therefore, the sleep disturbance noise criteria for the three residential NCAs are:

- NCA1: $L_{A90}$ (34 dBA) + 15 dBA= 49 dBA
- NCA2: $L_{A90}$ (38 dBA) + 15 dBA = 53 dBA

- NCA2: $L_{A90}$ (37 dBA) + 15 dBA = 52 dBA.

Construction noise management objectives for non-residential noise sensitive receivers, in accordance with ICNG, are provided in Table 8 for the non-residential NCAs (i.e. NCA 4, 6, and 7). These are noise management levels (NML) which are applied to limit potential disturbance (when establishment is in use), and are established independently of existing RBLs.

**Table 8: Noise management levels for non-residential receivers (ICNG)**

| Location | Receiver type | Noise Management Level. $L_{Aeq}$ dB(A) |
|---|---|---|
| NCA 4<br>NCA 6 | Offices, retail outlets | External noise level 70 dB(A) |
| NCA 5 | Place of worship | Internal noise level 45 dB(A) |
| NCA 7 | Childcare centre | Internal noise level 45 dB(A) |

*Noise modelling*

Construction of the Proposal would be undertaken over a period of approximately 18 months in various stages (refer Chapter 3 for more detail). Modelling of noise sources (including high noise generating vehicles and machinery such as trucks, power tools, jack hammers, excavators and grinders) for each construction activity was undertaken by Ausenco. The modelling took into account the construction staging of when certain construction plant would be operational and calculated a predicted noise level, based on the known Sound Power Levels for each item of plant.

The noise modelling predicted at which locations there might be exceedances of the PSNC and non-residential NML for the different phases of construction under a 'worst-case' scenario. During construction, it is unlikely that all machinery would be operational at the same time, but taking a 'worst-case' scenario approach helps to identify where noise impacts are likely to be a concern and assists in the formulation of mitigation measures.

The Proposal would utilise Roads and Maritime Services-owned land on Burrows Street as a construction site compound. The establishment and usage of the site compound has been assessed in the Arncliffe Pedestrian Link Noise and Vibration Impact Assessment (Ausenco, 2015b) and therefore has not been assessed for this report.

*Summary of noise impacts during standard hours*

The noise modelling indicated that there would be exceedances against the Proposal specific noise criteria (PSNC) for residential receivers in NCA 1 and NCA 3 during all major stages of construction during standard hours (up to 22 dBA for a worst-case scenario) and a minor exceedance at NCA 2 during the construction of new structures. However for most stages the noise levels are expected to be below the 'highly noise affected level' of 75 dBA, with the exception of receivers in NCA 3 during construction of new structures. This level of exceedance is common for these types of construction activities and represents a worst-case scenario assuming all equipment is operating at the same time.

There would likely be exceedances of the NML for the child care centre on Firth Street with noise levels up to 62 dBA during construction of new structures. However it is generally accepted that internal noise levels in a structure with windows open are 10-15 dBA lower than external noise levels, therefore it is likely that a noise level of 52 dBA would be

experienced inside which would be a 7 dBA exceedance of the NML. The scheduling of noise intensive construction activities would be undertaken in consultation with the child care centre and through the implementation of noise mitigation measures outlined in the REF.

Modelling indicated that the NML at other non-residential receiver locations (i.e. NCA 4, 5 and 6) would not be exceeded during construction works during standard hours.

*Summary of noise impacts during work outside standard hours*

Work outside standard hours would be required for a number of activities including structure works and façade works and services upgrade activities to minimise impacts to the rail network and ensure safety of the community. It is also understood that deliveries may take place outside standard daytime construction hours to minimise impacts to customers, traffic etc. Due to the low existing background noise levels, deliveries outside standard construction hours may potentially exceed the out of hours noise goals.

Modelling has also indicated that work outside standard hours would likely exceed the out of hours PSNC for all residential NCA. The worst-case exceedances would be expected during construction of new structures and could be up to 34 dBA at residential receivers in NCA 3, and with lesser exceedances of the out of hours PSNC in NCA 1 and NCA 2. The predicted night-time $L_{Amax}$ noise impacts would be in exceedance of the sleep disturbance criteria by up to 32 dBA, with the highest exceedances predicted at the residences located in NCA 3. There would not be any exceedances of the NML for non-residential receivers (NCA 4, 5, 6 and 7) during work outside standard hours.

The noise impact assessment and predicted noise impacts have been based on current understanding of work outside standard hours. Additional assessment will be required if there are changes to the work methodology, plant and equipment. Where a stage/activity specific construction noise and vibration impact statement is required, this should be prepared in accordance with the Transport for NSW's *Construction Noise Strategy* (Transport for NSW, 2012b).

**Vibration**

When assessing vibration there are two categories of vibration criteria, one related to the impact of vibration on building structures, and one relating to human comfort. The *Assessing Vibration: A Technical Guideline* (DEC, 2006) provides vibration criteria for human comfort. For intermittent vibration (like that which could result from construction machinery) the criteria is based on a concept of a vibration 'dose'. The maximum criteria level is 0.4 m/s$^{1.75}$ for residences during the daytime and 0.26 m/s$^{1.75}$ during the night time.

The German Standard *DIN 4150 1999-02 Standard Structural Vibration – Effects of vibration on structures* provides guidelines for vibration levels for building structures. For dwellings the Standard recommends a maximum allowable vibration velocity of 5 mm/s, and for commercial buildings a maximum allowable vibration velocity of 10 mm/s.

The Noise and Vibration Impact Assessment concluded that vibration at the nearest receivers is likely to be perceptible at times during the works. However the separation distances from the nearest residential receivers to the operation of vibration intensive plant would be sufficient to mitigate potential building impacts, including cosmetic damage, and would not result in exceedances of human comfort criteria at nearby receivers (Ausenco, 2015).

Attended vibration monitoring or vibration trials should be undertaken when proposed works are within the safe working distances to ensure that levels remain below the criterion. Safe working distances are listed in Table 9. Building condition surveys should also be completed

both before and after the works at all potentially affected properties to identify existing damage and any Proposal related damage.

Attended vibration monitoring or vibration trials should be undertaken when proposed works are within the safe working distances to heritage structures to ensure that levels remain below the most stringent 2.5 mm/s criterion.

**Table 9: Recommended safe working distances for vibration intensive plant (Ausenco, 2015)**

| Plant Item | Rating/Description | Cosmetic Damage (BS7385) | Human Response (DEC) |
|---|---|---|---|
| Vibratory Roller | < 50 kN (Typically 1-2 tonnes) | 5 m | 15 m to 20 m |
| | < 100 kN (Typically 2-4 tonnes) | 6 m | 20 m |
| | < 200 kN (Typically 4-6 tonnes) | 12 m | 40 m |
| | < 300 kN (Typically 7-13 tonnes) | 15 m | 100 m |
| | > 300 kN (Typically 13-18 tonnes) | 20 m | 100 m |
| | < 300 kN (> 18 tonnes) | 25 m | 100 m |
| Small Hydraulic Hammer | 300 kg – 5 to 12T excavator) | 2 m | 7 m |
| Medium Hydraulic Hammer | 900 kg – 12 to 18T excavator) | 7 m | 23 m |
| Large Hydraulic Hammer | (1600 kg – 18 to 34T excavator) | 22 m | 73 m |
| Jackhammer | Handheld | 1 m (nominal) | Avoid contact with structure |

Notes for **Table 9**:
Table data reproduced from Transport for NSW's *Construction Noise Strategy*
BS 7385 – British Standard 7385 Evaluation and measurement for vibration in buildings
DEC = Department of Environment and Conservation NSW
kN is kilo Newtons
kg is kilograms
t is tonnes
mm is millimetres
m is metres

### (b) Operational phase

*Proposal specific noise criteria*

The INP provides criteria for the assessment of noise impacts associated with industrial activities and aims to balance the need for industrial activity with the desire for quiet within the community. The INP criteria for industrial noise sources (e.g. mechanical plants) have two components:

- controlling the intrusive noise impacts for residences and other sensitive receivers in the short-term

- maintaining noise level amenity for particular land uses for residences and sensitive receivers in other land uses.

For intrusive noise, the equivalent noise level ($L_{Aeq}$) of the noise source over any 15 minute period should not be more than 5 dBA above the measured RBL. For amenity, the noise level for a particular period (e.g. day time) is calculated based on the existing industrial noise and an adjustment factor depending on the type of land use and associated activities (and their sensitivity to noise). The PSNC for the Proposal are then taken to be the lower of the two criterion (i.e. intrusive criteria or amenity criteria). The PSNC for operation have been developed based on continuous noise readings, in accordance with the procedures in the INP and are identified in bold in Table 10.

For the Proposal, the INP classifies the noise environment of the surrounding area as 'Suburban' which is characterised as an area that:

- has local traffic with characteristically intermittent traffic flows or with some limited commerce or industry
- decreasing noise levels in the evening period (6pm to 10pm)
- evening ambient noise levels defined by the natural environment/infrequent human activity.

**Table 10: Criteria for operational noise emissions at residential receivers (dBA)**

| Receiver type | Time of day | ANL Note 1 (period) | RBL $L_{A90}$ (15minute) | Measured $L_{Aeq\ (15minute)}$ | Intrusive Criteria Note 3 $L_{Aeq\ (15minute)}$ | Amenity Criteria Note 3 $L_{Aeq\ (Period)}$ |
|---|---|---|---|---|---|---|
| Residential (NCA 1) | Daytime (7am to 6pm) | 55 | 46 | 58 | 51 | **48** |
| | Evening (6pm to 10pm) | 45 | 43 | 56 | 48 | **46** |
| | Night-time (10pm to 7am) | 40 | 34 | 53 | **39** | 43 |
| Residential (NCA 2 ) | Daytime | 55 | 46 | 57 | 51 | **47** |
| | Evening | 45 | 44 | 58 | 49 | **48** |
| | Night-time | 40 | 38 | 54 | **43** | 44 |
| Residential (NCA 3) | Daytime | 55 | 45 | 58 | 50 | **48** |
| | Evening | 45 | 44 | 54 | 49 | **44** |
| | Night-time | 40 | 37 | 51 | 42 | **41** |
| Commercial premises (NCA 4) | When in use | 65 | - | - | n/a | **65** |
| Place of worship (NCA 5) | When in use | 40 (internal) | - | - | n/a | **40 (internal)** |
| Commercial premises (NCA 6) | When in use | 65 | - | - | n/a | **65** |
| Child care (NCA 7) | When in use | 40 (internal) | - | - | n/a | **40 (internal)** |

Notes:
Note 1 – ANL Acceptable Noise Level for a suburban area
Note 2 – INP recommended values for new source of noise, assuming existing noise levels unlikely to decrease
Note 3 - amenity criteria developed based on conservative assumption that measured $L_{Aeq}$ is from industrial noise, and the assumption that existing noise levels are unlikely to decrease

*Noise modelling*

The operations of Arncliffe Station would remain unchanged once the Proposal is operational. Therefore, operational noise impacts from Arncliffe Station are unlikely to increase during operation.

However, any mechanical plant (such as lifts) installed as part of the Proposal should be designed to achieve the project specific operational noise criteria presented in Table 10 and to be free from annoying sound characteristics such as tonality, low frequency, impulsive and intermittent.

As the mechanical plant has not yet been selected at this stage of the Proposal, it is not practicable to specify individual acoustic requirements for each unit. Based on the INP noise goals at the nearest sensitive receivers, an indicative overall $L_{Aeq}$ Sound Power Level emissions from the Proposal noise sources should not exceed 69 dBA for night time, 72 dBA for evening and 76 dBA for daytime operations.

### 6.3.3. Mitigation measures

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 Strategy* (Transport for NSW, 2012b) and the Noise and Vibration Impact Assessment (Ausenco, 2015).

The CNVMP would be the key management document that would prescribe specific mitigation measures to help reduce the impacts of construction noise and vibration. The measures would focus on contractor inductions, and the efficient operation of plant and equipment, along with prescribing safe working distances for vibration intensive equipment, and detailing procedures for noise and vibration monitoring and for obtaining Transport for NSW approval for work outside standard hours. The CVNMP would also detail requirements for managing potential vibration impacts to heritage items through monitoring and nominating safe working distances.

The CNVMP would also be supported by the Community Liaison Plan to be prepared for the Proposal, which would detail community notification requirements which can range from letter box drops, phone calls to offers of alternative accommodation in specific circumstances in accordance with Transport for NSW's *Construction Noise Strategy* .(Transport for NSW, 2012b).

Plant and equipment for the Proposal would be designed and procured to meet INP requirements. Operational noise monitoring would be undertaken during the commissioning phase to ensure that the PSNC for operational noise have been met.

Refer to Table 11 for a list of proposed mitigation measures.

## 6.4. Indigenous heritage

### 6.4.1. Existing environment

The Proposal is located in an area that has been highly modified for the construction of the railway line. The site has low archaeological potential and therefore is it considered unlikely that any Indigenous heritage items or sites would be located in the vicinity of the Proposal due to the past history of disturbance.

A search of OEH's AHIMS database was undertaken on 7 October 2014. This search indicated that no Indigenous heritage items or sites have been recorded within the footprint or adjacent to the Proposal.

### 6.4.2. Potential impacts

#### (a) Construction phase

Construction of the Proposal would involve minor earthworks and other ground disturbance activities which have the potential to impact Indigenous sites, if present. As no known Indigenous heritage items are located in the vicinity of the Proposal and the potential for unknown items is low, the Proposal is unlikely to affect Indigenous heritage during construction.

#### (b) Operational phase

There would be no risks to Indigenous heritage from the operation of the Proposal.

### 6.4.3. Mitigation measures

If unforseen Indigenous objects are uncovered during construction, work would cease in the vicinity of the find and the Transport for NSW Project Manager and Environment & Planning Manager are to be immediately notified to assist in co-ordinating next steps which are likely to involve consultation with an archaeologist, the OEH and the Local Aboriginal Land Council. If human remains are found, work should cease, the site should be secured and the NSW Police and the OEH should be notified.

If changes are made to the Proposal that may result in impacts to areas not considered by this assessment, further assessment would be required.

Refer to Table 11 for a list of proposed mitigation measures.

## 6.5. Non-indigenous heritage

The Arncliffe Railway Station Group is listed on the State Heritage Register, the RailCorp Heritage and Conservation (Section 170 Register), and the heritage schedule of the Rockdale LEP. The Stage Heritage Register curtilage for the station is shown in Figure 12.

Arncliffe Station has historical significance as an important original station on the Illawarra Railway, which demonstrates development of the railway from 1884 to 1925. The station has historic and social significance as a transport hub for the Arncliffe area.

A Statement of Heritage Impact (SoHI) was prepared for the Proposal by Australian Museum Consulting (2015) in accordance with the principles of the *Burra Charter: The Australia ICOMOS charter for the conservation of places of cultural significance 2013* as well as

current best-practice guidelines identified in the *NSW Heritage Manual* (NSW Heritage Office, 1996) and associated supplementary publications..

### 6.5.1. Existing environment

Other locally listed heritage items in the vicinity of the Proposal are:

- Street plantings, Firth Street
- 'Glenwood', 27 Eden Street
- 'Bard of Avon', 39 Eden Street
- Arncliffe Post Office, 35 Firth Street
- Glenevie Lane, Firth Street, laneway between Nos 43 and 44 through to Stanley Street)
- Victorian shop and dwelling, 45 Firth Street.

None of the above items would be potentially impacted by the Proposal. The mature Fig, Brushbox and Camphor Laurel trees to the south of the station (although not specified) are considered to be the primary contributory elements of the Street Plantings listing (not the Cypress trees immediately opposite Platform 1/2).

Arncliffe Railway Station opened on 15 October 1884. The early station footbridge was reconstructed and the first overhead booking office was demolished in 1919. In 1925, the second overhead booking office was constructed and this later building survives. The booking office, Station Manager's office and station newsagent are housed in a weatherboard-clad building. The overhead booking office is historically associated with the rail quadruplication works to Hurstville in the 1920s.

The existing station footbridge has been extensively modified including the replacement of original weatherboards with fibre-cement board siding and replacing the timber gable screen with fibre-cement boards to close the gable ends of the stairs to Platform 1/2. The booking office is considered to be a fair representative example of its type, despite its recladding. (refer to *Railway Overhead Booking Offices Heritage Conservation Strategy* , Australian Museum Consulting 2015.)

**Statement of significance**

The station is considered to be one of the best examples of suburban station architecture from the boom period of railway construction. The group has historical, aesthetic, social, rarity and representativeness significances with good integrity. The Statement of Significance is:

> *Arncliffe Railway Station is of State historical significance as an important station on the Illawarra Line, demonstrating its development from 1884 to 1925, including adaptation of two wayside buildings for island use. The Arncliffe Railway Station is of historical significance as one of three remaining stations with 1880s 'second class' brick platform buildings on the Illawarra line, and is one of the best examples of suburban station architecture from the first period of construction on the Illawarra Line. The platform buildings are of aesthetic significance, the Platform 1/2 building being an elaborate Victorian Italianate style building with decorative cast iron columns and brackets to awnings, and elaborate detail, the Platform 3/4 building being an 1884 wayside platform building altered in 1923 to an island platform building. The Arncliffe Railway Station 1919 steel footbridge and stairs, the 1923 overhead booking office and the concrete and brick overbridge are considered to be good representative examples of their types.*

The significance of the overhead footbridge and booking office is specifically identified as complying with Criterion g), Representativeness:

> *The Arncliffe Railway Station 1919 steel footbridge and stairs, and the 1923 overhead booking office are considered to be good representative examples of their types.*


**Figure 12: State Heritage Register curtilage for Arncliffe Railway Station Group**

## 6.5.2. Potential impacts

For the consideration of heritage impacts, the proposed upgrade works can be broadly classified into the following categories:

**Key new additions**

- installation of four new lifts
- new canopy and security screens along the full length of the pedestrian footbridge (supported on a separate structure cantilevered from the lift structures)
- new platform canopy awnings on Platforms 2 and 3 extending from the lifts to the platform buildings

- new concrete deflection walls to the southern side of the main footbridge protecting piers
- family accessible toilets on each platform.

*Lifts*

The lift shafts are based on impact-resistant in-situ concrete walls extending up to the footbridge level. Above footbridge level, the steel structure with glazed walls extends up to top of the lifts. Lifts have window sizes that reflect the structural requirements of the lift shaft.

The lift shafts would be located to maintain a separation from the footbridge. The detailing of the shafts would reflect the horizontal detailing of the adjoining booking office and the shaft corners would be detailed with steel corners to interpret the footbridge and reduce the visual bulk. The colour of the shafts would interpret the colour and shade of the adjoining steel and masonry.

The lift shafts would reduce views into the area in the vicinity of the footbridge piers and the steel trestles on the platforms. The lifts would reduce views of the upper southern elevation of the footbridge and booking office from the south, within the rail corridor, and from the two streetscapes. The lift will block views of the platform buildings and platforms from the southern end of Firth Street.

*Footbridge structure*

The new support structure adjacent to the footbridge is designed to take the load of canopies, balustrades and security screens off the heritage fabric of the existing footbridge. There would be no transference of load from the new to the old structure. This design would not physically impact on the heritage structure, but highlight it as an asset. It would provide a clean line of distinction between new and existing elements. The structure does not rise above the roofline of the heritage footbridge and structure, and therefore would be hidden from views from the platforms.

Concrete beams are proposed to span between the lifts, with concealed concrete columns at the ends. The new beams would reduce the views of the southern elevation of the substructure which supports the footbridge. The extensive glazing assists in minimising the mass of the new walkway as it sits behind the booking office. The extensive glazing provided via the new structure would enhance the views through to the booking office. However, the eastern and western extents of the beams and associated canopies would alter the main visual cue of the station on the two streetscapes.

The design is seen as a quality industrial expression, physically separated from the heritage item, using new steel beams in a way that interpret the old steel structure. The steel would be used in a structural way and not as decoration, with consistent use of I-beams and steel angles bolted together. This would relate the new work to the heritage structures which generally used only steel angles bolted together in different combinations. The cantilevered concrete canopy base would reflect the actual structural requirements. The new weather protection canopies rely on galvanised and painted structural steel and corrugated steel sheeting. The colour scheme of all new elements is meant to create a darker, subdued effect in contrast to the light colours of existing heritage elements, intended to make the white weatherboard stand out.

The existing walls and balustrade sections of the southern side of the footbridge would be removed and clear glazing would be installed (subject to detailed design). The existing booking office and station manager’s office would remain unchanged, with the upgrade of

any impacted station services to this building. The extensive glazing would provide views across the local area to the west and south.

The new footbridge structure would highlight the original weatherboard structure and it is proposed to make improvements to the structure including by reinstating weatherboard cladding and detailing to the exterior of the booking office building on the footbridge, and re-painting.

The structure is designed to extend east and west (towards Firth Street and Burrows Street) to incorporate prominent entries with station identification. There is no proposed canopy over the stairs leading down to the platforms and this is regarded as a better design response to the heritage precinct. Sheltered access from the lifts to the platforms is provided by platform canopies.

*New platform canopies*

On platforms, canopies have been provided to connect lifts with platform buildings and protect passengers from the elements. The proportions and roof angles of those structures would correspond to the existing Victorian verandas on the platform buildings. The column support structure would be minimal to minimise the footprint on to the existing open platforms. The colour of the new elements would be grey engineering steel so as to remain visually subservient.

*Deflection walls*

The height and length of the proposed deflection walls at brick piers #1 and #4 are subject to detailed design. The walls could reduce views from the north to the south and vice versa from the platforms to the significant platform buildings.

**Modifications to existing heritage elements**

Proposed works include:

- installation of new family accessible toilets in the platform buildings on Platforms 1/2 and 3/4
- modifications to the eastern entrance – the existing commuter car park off Burrows Street would provide for disabled parking spaces and a turning bay, and bicycle racks, an accessible path to the station and new landscaping would be added.
- modifications to the stairs
- landscaping.

*Family accessible toilets*

The platform buildings would receive partial refurbishment. The section of the building adjacent to the tenant's toilet on Platform 1/2 is disused and would have the existing internal partitions demolished and replaced with two new family accessible toilets. To achieve DDA compliance, the platform level would need to be locally raised in the vicinity of the existing door. The existing retail tenant's toilet remains unchanged. See Figure 13 below.

The current toilet block to the north of Platform 1/2 would potentially be refurbished and brought into operation in connection with the requirement to temporarily close off existing toilets during construction. These toilets may then be retained for future non-public use (as they are considered to be too remote for general public use). See Figure 13 below.

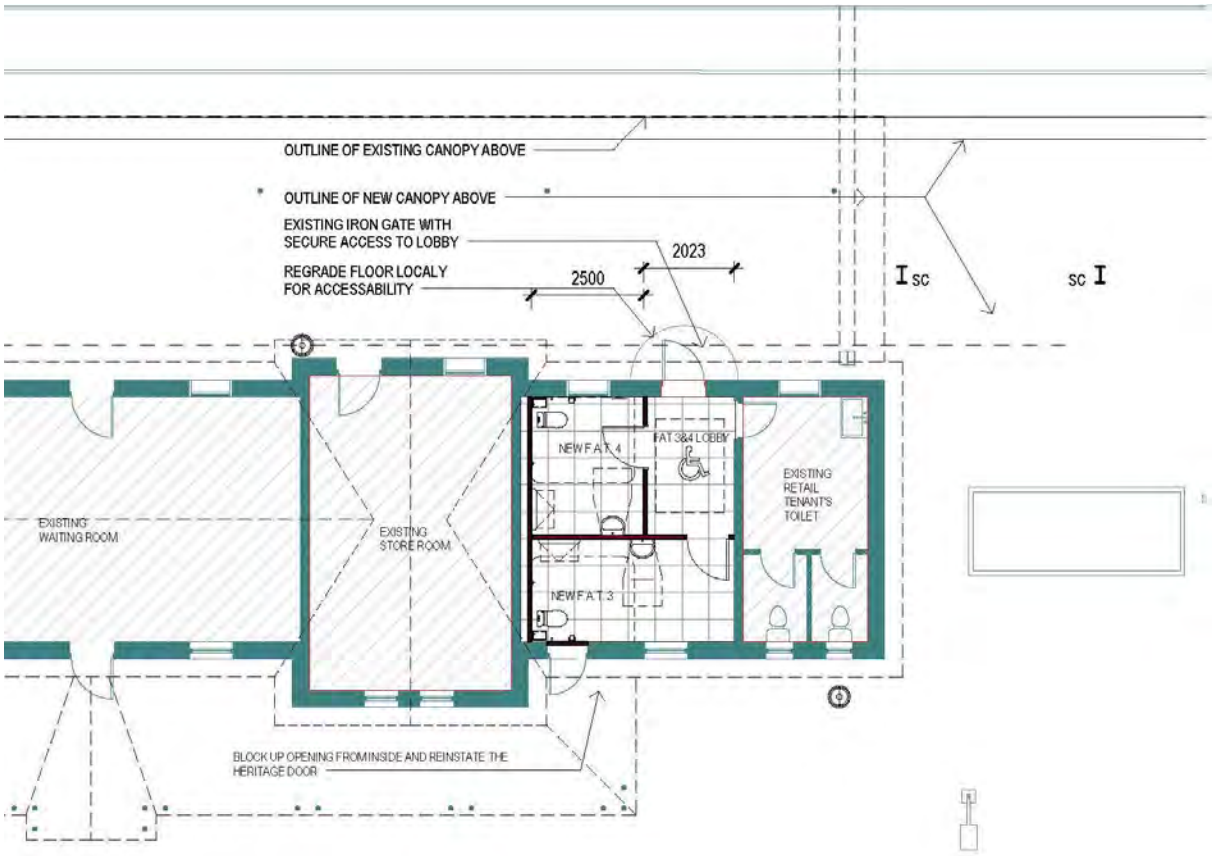



**Figure 13: Platform building on Platform 1/2 indicating proposed Family Accessible Toilet (subject to detailed design)**

On Platform 3/4, the existing men's toilets would be replaced with two new family accessible toilets. This would include demolition of the privacy screen wall to the south of the building, and internal brick walls, partitions and plumbing fixtures. There would be no changes to the existing courtyard area, currently used for storage. There would be no impact on the current female toilets.

In both cases, the original grill doors that provide access to the toilets would remain open whenever the station is staffed.

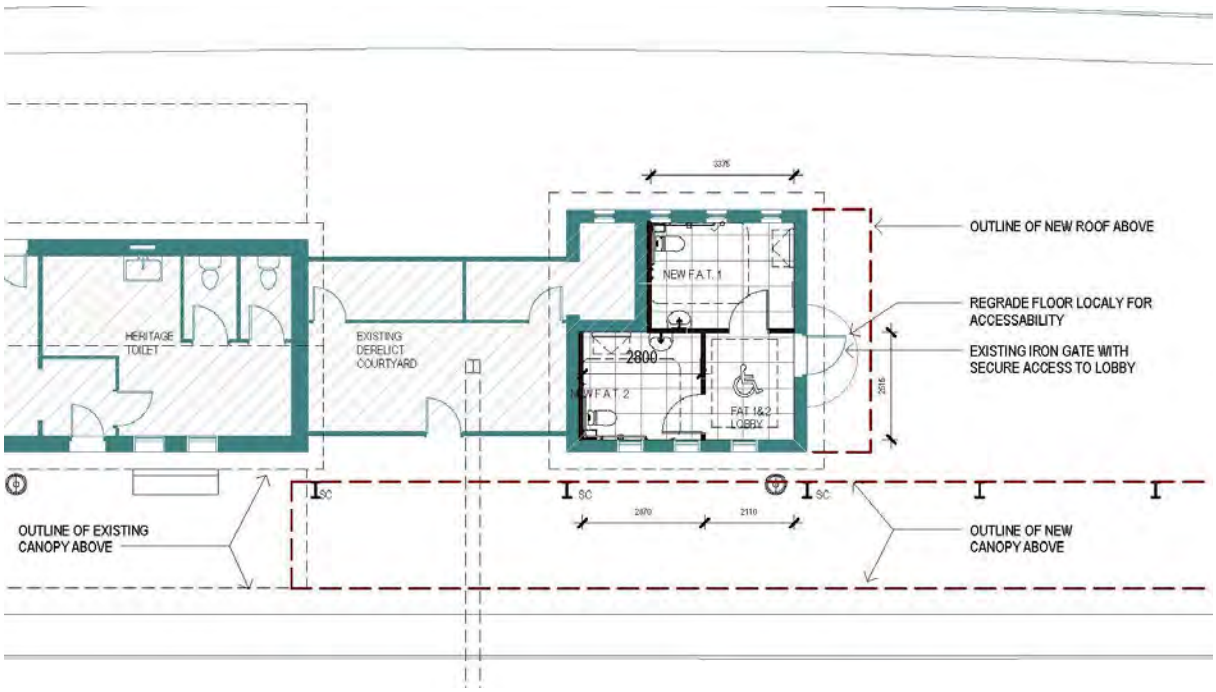



**Figure 14: Platform building on Platform 3/4 indicating proposed Family Accessible Toilet (subject to detailed design)**

*Eastern entrance*

The changes to the existing commuter car park on the eastern side of the station are within the heritage curtilage. This area would need to be temporarily closed during construction to allow for construction access. Two accessible parking spaces and a turning bay would be provided by extending the car park to the south. This would require the removal of one tree on the current southern boundary, and there is the potential for a net loss of two to four parking spaces. During detailed design, the intention is to minimise any loss of commuter parking spaces. The accessible parking spaces would link to an accessible pathway to the eastern lift. Seating and bicycle racks would be installed in this area, with new landscaped areas to be provided.

The Proposal removes no significant fabric and replaces an area of soft landscape between the end of the existing car park and footbridge piers with a combination of pavement and planting. There is no impact on views to and from the site.

*Stairs*

The existing stairs and handrails to stairs do not comply with codes and standards (e.g. there are inconsistent stair risers/treads) and these would be upgraded to meet DDA and BCA requirements. Stair treads may require complete or partial replacement, and high visibility slip-resistant nosings would be installed. The handrails would be retro-fitted to the required compliant length, and damaged tactile indicators would be replaced. The western entry stairs and the stairs to Platform 1/2 are the original and significant staircases. The original significant handrails are to be retained.

Where required, anti-throw screens are proposed on sections on the platform stairs, and these are to be as light weight and low-scale as safety provisions permit.

*Western entrance*

The embankment on the western side (Firth Street) of the rail corridor near the station entrance would be replaced with a retaining wall and pavement occupied by street furniture. Four trees would be removed in connection with this work. The corresponding section of the existing fencing would be upgraded to a palisade style fence. The remaining cypress trees along the RailCorp boundary in Firth Street opposite the station (12 trees) would be retained if possible, subject to the installation of new/upgraded shelters. Trees would be crown lifted to gain conformance with safety and security (CPTED) guidelines. Any trees removed would be replaced as per the Transport for NSW *Vegetation Offset Guide*.

The existing vacant shop (c.1950s) at the Firth Street forecourt would be partially demolished to provide for the new lift, a new Communications Room and to provide the required clearances. The remaining section of the vacant shop would be used as a maintenance and communications room. The resulting separation of the lift from the stairs would likely enhance the aesthetic value of the station.

**Impacts of new additions and modifications**

The introduction of these new additions to the Arncliffe Railway Station Group, including new lifts and new canopies to the footbridge and platforms, will change the aesthetic and heritage character of Arncliffe Railway Station. However, the new structures would adopt design principles which will differentiate these elements as modern additions to the station precinct, whilst being sympathetic to the heritage values of the remaining group elements.

Aspects of the design and proposed mitigation measures respect and would likely enhance the identified significance of the Arncliffe Railway Station Group.

**Other modifications**

Other works would be undertaken, including measures to mitigate the impact of the Proposal as follows:

- replacement of the existing transformer north of the platforms (near the signal hut and outside the heritage curtilage) with an upgraded potentially larger transformer on the same site. Service trenching to the lifts would also be required
- the potential undergrounding of the 33kV aerial line east of Platform 4, and in this case the removal of the aerial cables, would be a positive impact on heritage views
- trenching on the platform and through the coping edge in one location would be required for electrical bonding works. Other service trenching would also be required for electrical and drainage works (although most services would be located in the new canopy structures). All surfaces would be ‘made good’
- removal of the external security bars and metal screens from significant windows to the three buildings and make good while installing perforated stainless steel mesh screens on windows requiring security
- removal of the unsympathetic attachments including window mounted air-conditioners, surface mounted conduit and redundant services from the significant external walls of the four buildings
- replacement of any acrylic glazing with glass panes to significant external windows on the four buildings
- relocation of the vending machines which adjoin the four significant buildings to locations which do not abut or obstruct views to and from the significant external walls of the four buildings
- retention of the existing commercial tenancy within the ticket office building on the footbridge to complement the original uses and the amenity for station users

- retention of the community rail hobby uses within the Platform 1/2 building and adapt the space to ensure the services and access are code compliant.

**Construction phase**

The city end of both platforms would be required for temporary construction compounds.

Construction of the new lifts, and the separate structure that would support the full-length canopy and security screens, would be built immediately adjacent to the southern end of the existing footbridge. This creates the potential for impacts on the heritage structure, particularly as a result of vibration and dust.

Similarly, the adaption of the heritage platform buildings to house the proposed family accessible toilets would require these to be closed during construction and there would also be the potential for accidental or inadvertent damage to the structures.

The Proposal would require a Section 60 Application to the Heritage Council of NSW as it would involve work on an item listed on the State Heritage Register.

The Proposal would not impact on any of the surrounding heritage items. There would be no impact on the heritage listed trees on Firth Street (located south of the southern station entrance), on the road overbridge.

**Operational phase**

The design of the four new lifts and related circulation spaces integrated with the southern side of the existing footbridge and booking office respects, and will likely enhance aspects of the heritage significance of the Arncliffe Railway Station Group, including by improving views to and from the footbridge and maintaining the representativeness and integrity of the footbridge.

The introduction of a new support structure immediately adjacent to the existing footbridge has the potential to detrimentally impact on the historic and aesthetic significance of the Arncliffe Railway Station Group by obscuring the original form of the footbridge. However, the footbridge and booking office have been modified in the past and the current proposal includes sympathetic refurbishment of the booking office which will mitigate any loss of understanding of the historic and aesthetic significances of the railway station.

The new design for the footbridge is in accordance with *the Railway Overhead Booking Offices Heritage Conservation Strategy* (Australian Museum Consulting, 2014) in that it is DDA compliant without having a detrimental impact on the heritage values of the footbridge or Arncliffe Railway Station. The design also presents an opportunity to refurbish the booking office to reflect its original appearance.

### 6.5.3. Mitigation measures

The detailed design and construction of the Proposal would be undertaken with consideration of the heritage values of the station and surrounds.

The Contractor would be required to engage a heritage architect and give due consideration to the design of the external elements such as the lifts and canopies, along with the internal proposed alterations to the station buildings. The design would be prepared in consultation with Transport for NSW and Sydney Trains, taking into consideration the recommended mitigation measures prescribed in the Statement of Heritage Impact (Australian Museum Consulting, 2015).

The final design would need to be approved by Transport for NSW, in consultation with Sydney Trains, and through the submission and approval of a Section 60 application from the Heritage Council in accordance with the provisions of the *Heritage Act 1977* , prior to any works commencing. A Section 60 application is to be submitted at the same time as the public display for the REF.

As the Arncliffe Railway Station Group and tree plantings on Firth Street are listed on the Rockdale LEP, the Rockdale City Council would also be notified of the proposed upgrade works.

Archival recording would be undertaken of the Station Footbridge, Concourse and Overhead Booking Office in accordance with relevant NSW heritage guidelines.

The recording should be undertaken in accordance with guidelines *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office, 1998. and *Photographic Recording of Heritage Items Using Film or Digital Capture* (NSW Heritage Office 2006). In addition, internal and external scanning of the station building is to be undertaken with a 3D laser device, in a suitable electronic data format (i.e. CAD software or equivalent).

A CEMP would be prepared by the Contractor that would prescribe mitigation measures to be implemented during the construction period. This would include identifying the heritage curtilage and heritage items/area on Environmental Control Maps and specifying 'no-go' zones for construction activities including the southern trees on Firth Street. The CEMP would also specify requirements for heritage inductions to be undertaken by all staff, and procedures for unexpected archaeological finds.

Refer to Table 11 for a list of proposed mitigation measures.

## 6.6. Socio-economic impacts

### 6.6.1. Existing environment

Arncliffe Station is located in the suburb of Arncliffe, approximately eight kilometres south-west of the Sydney CBD within the Rockdale LGA. The station is located on the T4 Eastern Suburbs and Illawarra Line and is the 125th busiest station on the network with approximately 3,480 trips recorded on an average weekday in 2013.

Arncliffe Station is located west of the Princes Highway and the M5 motorway which are the main arterial roads linking Arncliffe to nearby suburbs (refer to Figure 3 ). The station is located within the town centre which comprises a combination of residential and commercial premises.

Land use on the eastern side of the railway line includes a small commuter car park that is accessible from Burrows Street, with a neighbourhood playground and apartments located off Butterworth Lane and Eden Street. Pedestrian access to the station is via a footpath that traverses the playground.

Further east, is vacant land that is owned and maintained by Roads and Maritime Services and has been used for construction purposes for the M5 motorway upgrade. It is also proposed to utilise this land for temporary commuter parking and construction compound for the Proposal.

On the western side of the railway line there are a number of small commercial business including cafes and other retail that extend along Firth Street and Belmore Street. A vacant

shop situated on RailCorp land, and that is not part of the heritage listing, would be affected by the Proposal.

Residential dwellings and apartments are located further south on Firth Street and west on Station Street.

To the north of the station is the railway line, along with an industrial precinct further north and a rail underpass at Wollongong Road. To the south of the station is the railway line and residential dwellings along Eden Road.

The broader area is subject to ongoing land use changes. Most notably, large scale high density residential development has occurred to the north at Wolli Creek. This is consistent with the strategic vision for the area which includes identifying the opportunity for key housing redevelopment around key transport corridors, namely the T4 Eastern Suburbs and Illawarra railway line.

### 6.6.2. Potential impacts

#### (a) Construction phase

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

- temporary loss of car parking to allow for works in the eastern commuter car park and along Firth Street, and which would be partially offset by providing commuter parking spaces at the Burrows Street compound (approximately 160 metres away from the station)
- temporary relocation of bus stop on Firth Street and bicycle rack on eastern side of the station
- changes to accessing station entry points and platforms however the same of level service would be maintained during normal operations
- reduced platform length due to the proposed use of the northern ends of the platforms as temporary construction compounds
- temporary weekend closures of Arncliffe Station to construct new lifts, concourse extension and canopy installation with a temporary shuttle bus in operation
- disruptions to station facilities and amenities (e.g. toilets and concourse building)
- increase in truck movements delivering site materials, plant and equipment
- construction noise, dust and visual impacts.

#### (b) Operational phase

There would be some changes on Firth Street to allow for a new widened footpath, vehicle bay for bus stop and new taxi/kiss and ride area and shelter which would include the removal of approximately two parking spaces. Approximately two to four parking spaces from the commuter car park would also be permanently removed to allow for new infrastructure. The number of spaces to be impact would be determined during detailed design, and minimised as far as possible. However, given there is other short term parking areas available in the town centre there is not expected to be a major impact on parking demand in the longer term. The Proposal would encourage the use of public transport by improving accessibility and station interchange facilities.

The vacant RailCorp-owned shop on Firth Street would be impacted by the works and be reduced in size to allow space to separate the lift structure from the existing stairs.

Opportunities to reuse the shop space following the completion of works would be investigated.

No property acquisition would be required by the Proposal, and access to private properties would not be affected. Shops on Firth Street are likely to experience positive socio-economic impacts associated with the improved station and facilities that would encourage the use of public transport.

Overall, the Proposal would provide positive socio-economic benefits to Arncliffe and the Rockdale LGA, including:

- improved accessibility for customers to Arncliffe Station – including the provision of an accessible route for the mobility impaired to station platforms
- improved transport interchange facilities including new vehicle bay for bus stop and new taxi/kiss and ride area on the western side of the station and upgraded bicycle racks on both sides of the station
- improved customer amenity and facilities at the station, including two family accessible toilets and canopies for weather protection
- potential increased use of public transport to and from Arncliffe.

### 6.6.3. Mitigation measures

Refer to Sections 6.1, 6.2 and 6.3 for discussion on the potential traffic, transport, visual and noise impacts arising from construction of the Proposal and the proposed management strategies.

Table 11 provides a number of environmental safeguards to minimise these potential impacts with a particular focus on keeping the community informed and includes the following:

- site personnel would purchase goods and services locally, helping to ensure the local community benefits from the construction of the Proposal
- the Community Liaison Plan would 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 possible
- the community would be kept informed of construction progress, activities and impacts in accordance with the Community Liaison Plan (to be developed by the Contractor prior to construction)
- 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.

## 6.7. Biodiversity

Australian Wetland Consulting prepared a Flora and Fauna Impact Assessment for the Proposal (AWC, 2015). The study involved:

- data and literature review (including the Australian Faunal Directory, the Australian Plant Census, Atlas of NSW Wildlife, and NSW Department of Primary Industries Noxious Weeds Database)
- targeted site assessment on 30 October 2014 when weather conditions were dry
- statutory assessment.

The flora assessment included:

- targeted searches for threatened flora species identified from the Atlas of NSW Wildlife search results
- Random Meander throughout the site and compilation of flora census using a Braun-Blanquet index
- ground-truthing and identification of surveyed trees.

The fauna assessment included:

- incidental records of all fauna groups while at the site from direct observation, aural record, or identification of scats/tracks/other signs
- assessment of fauna habitat at the site.

### 6.7.1. Existing environment

#### (a) Flora

**Vegetation**

Land surrounding the Proposal site consists primarily of urban streetscapes and residential and industrial developments, interspersed with paved footpaths and small parks/reserves.

Refer to Figure 15 and Figure 16 for an overview of the trees present on the Proposal site and the Burrows Street compound site.

Arncliffe Station is flanked by degraded vegetation on the railway batters dominated by Lantana (*Lantana camara*) and Green Cestrum (*Cestrum parquis*). Street trees planted along Firth Street (west of the station) comprise ornamental Cypress ( *Cupressus sp*.); east of the station within the adjacent car park a number of mature Brushbox ( *Lophostemon confertus*) have been planted and a Cypress tree. Street tree plantings along Firth Street to the south of the station entrance are designated as being of local historical significance in the Rockdale LEP.

The Burrow Street compound comprises degraded grassland dominated by weed species such as African Lovegrass ( *Eragrostis curvula*), Plantain ( *Plantago lanceolata* ) and Rhodes Grass ( *Chloris gayana* ). Several mature trees are planted around the site perimeter and include Tallowwood ( *Eucalyptus microcorys* ), Bangalay ( *E. botryoides* ), Teak ( *Flindersia australis*), Silky Oak ( *Grevillea robusta* ) and Narrow-leaved Black Peppermint ( *Eucalyptus nicholii*). Ornamental plantings of Coastal Rosemary ( *Westringia fruticosa* ) occur along part of the northern boundary.


**Figure 15: Vegetation plan Burrows Street Compound (AWC, 2015)**

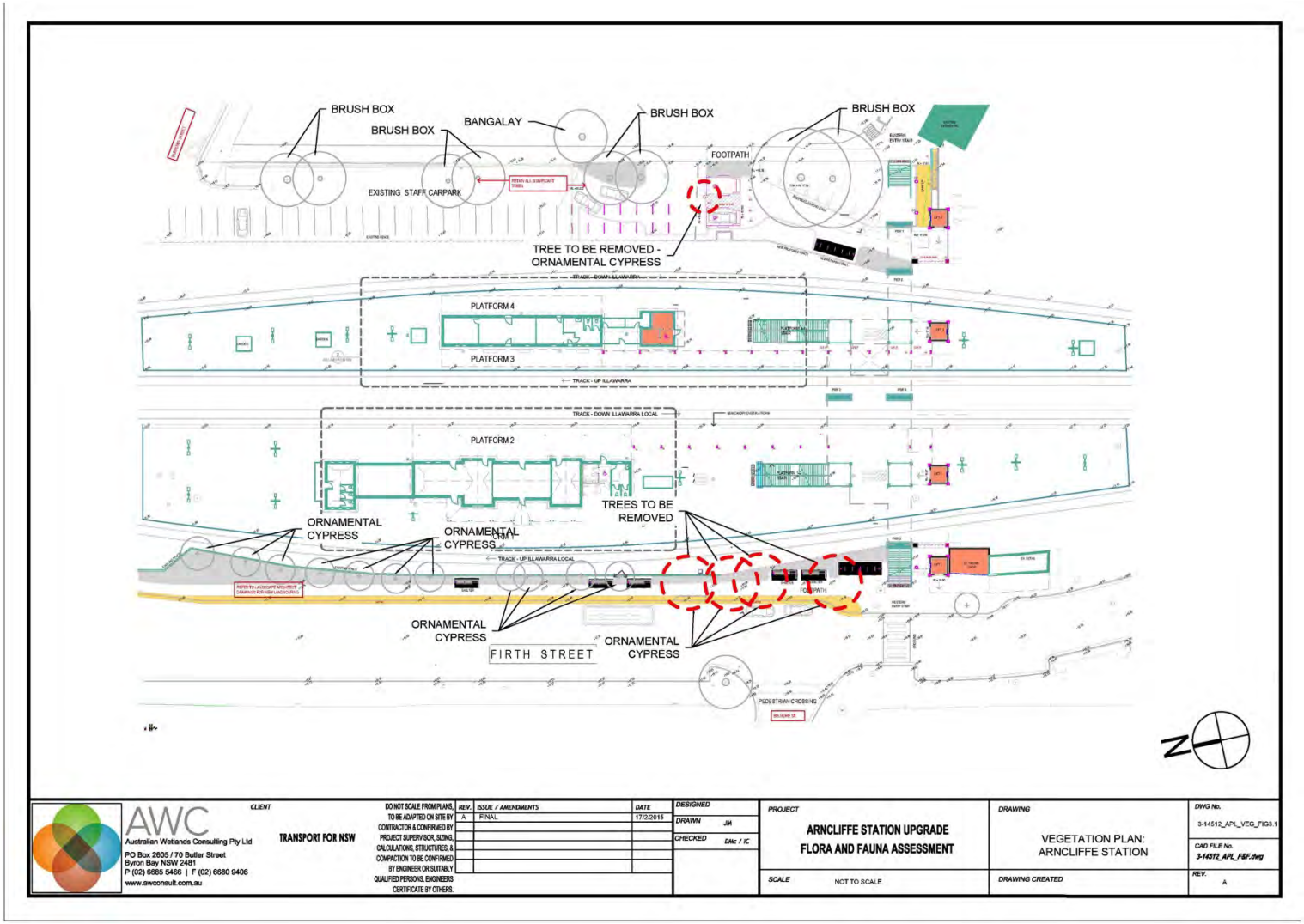



**Figure 16: Vegetation plan Arncliffe Station (AWC, 2015)**

### Threatened flora

One threatened flora species, a single Narrow-leaved Black Peppermint ( *Eucalyptus nicholii*) was recorded in the central portion of the Burrows Street compound. This species is listed as Vulnerable under the TSC Act and the EPBC Act and is not endemic to the Sydney area. It is occasionally planted as a street/landscape tree, as seen on this site.

No endangered ecological communities (EECs), as listed in the TSC Act, occur based on the floristic, hydrological and soil characteristics of the vegetation communities present at the Proposal site or the Burrows Street compound.

Vegetation at the Proposal site and the Burrows Street compound is not characteristic of any threatened ecological communities (TEC) listed in the EPBC Act.

No additional threatened flora species were observed during the field investigations or are considered to have the potential to occur on site.

### Condition and conservation value of the vegetation

Both the Proposal site and Burrows Street compound have been significantly disturbed. The original clearing associated with the construction of the railway line and station at the Proposal site, and the use of Burrows Street compound has resulted in the absence of any native vegetation. Both sites are characterised by weed species that are characteristic of disturbed and waste areas. One noxious weed species, Lantana occurs on the Proposal site.

Vegetation at the site has low conservation value due to the high incidence of weed species and the degraded nature of both sites. The *Draft Rockdale Biodiversity Strategy 2014* does not identify any parts of the study area as being of conservation significance (Rockdale City Council, 2014).

## (b) Fauna

### Fauna habitats

Due to the degraded and highly urbanised nature of the study area, neither site provides habitat for more than typical disturbance adapted bird species. Planted eucalypts at the Burrows Street compound may be utilised by Grey-headed Flying-foxes, while several species of microchiropteran bat may use the site as foraging habitat. Due to the general absence of structures or trees with hollows, roosting habitat for microchiropteran bats is poor; however the mature Tallowwood in the north-east of the Burrows Street compound contains at least one hollow spout, which may be utilised by hollow-dependent fauna. No aquatic habitat occurs within the Proposal site or the compound site.

### Fauna species

One reptile species and six bird species were recorded during the site investigations. These species are the Garden Skink ( *Lampropholis delicata* ), Australasian Figbird ( *Sphecotheres vieilloti*), Common Myna ( *Acridotheres tristis* ), Noisy Miner ( *Manorina melanocephala* ), Pied Currawong ( *Strepera graculina* ), Rainbow Lorikeet ( *Trichoglossus haematodus* ) and Tawny Frogmouth ( *Podargus strigoides* ). These species are widespread and common in urban areas.

### Threatened and migratory species

No threatened fauna species were recorded during the site investigations. Of the 28 threatened fauna species previously recorded within five kilometres of the site, only the Grey-headed Flying Fox may occur on the Burrows Street compound. The Burrows Street

compound contains some foraging habitat for this species, however there is no roosting habitat on the site.

No migratory species listed under the EPBC Act were recorded on the sites. Due to the limited resources present in the study area, the likelihood of occurrence for migratory species listed under the EPBC Act is considered unlikely.

### 6.7.2. Potential impacts

#### (a) Construction phase

The Proposal would require the removal of a single planted Cypress tree from the commuter car park on the eastern side of the railway station, and the removal of up to four Cypress trees along Firth Street, immediately to the north of the station entrance (refer Figure 16). All other vegetation would be retained.

Use of the Burrows Street compound would not require the removal of any of the planted trees and the site would be planned to accommodate and protect existing trees.

The mature Fig, Brushbox and Camphor Laurel trees to the south of the station (although not specified) are considered to be the primary contributory elements of the Street Plantings listing (not the Cypress trees immediately opposite Platform 1/2 and to the north of the station entrance). As such, t here would be no impact on the heritage listed street trees on Firth Street.

Impacts of vegetation clearing can be both direct and indirect. Direct impacts result in the loss of plant species and fauna habitat features that occur in the area. This may include possible nesting habitat, as well as feeding and shelter resources. Indirect impacts may include changes to runoff patterns.

Whilst there is potential for the individual Narrow-leaved Black Peppermint species on the Burrows Street compound to be impacted when the site is being used, appropriate mitigation measures would be put in place to protect this tree as well as the other trees prior to construction commencing. By utilising temporary fencing or barriers around the trunk and root systems during construction, vegetation would be protected from damage.

The layout of the compound site will take into consideration the individual trees, including the threatened species, to ensure they are not impacted, whilst allowing adequate space for vehicle movement and storage of materials.

In accordance with Section 5A of the EP&A Act, an Assessment of Significance has been prepared for the Narrow-leaved Black Peppermint and the Grey-headed Flying Fox. The Assessments of Significance concluded that the Proposal would not result in significant impacts and hence a Species Impact Statement and referral to the Commonwealth Department of Environment would not be required.

An Assessment of Significance with regard to the provisions of Section 220ZZ of the FM Act and Section 5C of the EP&A Act has not been completed as none of the listed species or communities occur at the site and suitable habitat is not present. Furthermore, the Proposal is not a key threatening process listed under the FM Act.

**Vegetation offsets**

Transport for NSW has prepared a *Vegetation Offset Guide* (Transport for NSW, 2013d) to assist in meeting the biodiversity sustainability target and to provide a framework for a

consistent approach to offset impacts to vegetation on applicable Transport for NSW projects. The following ratios for the provision of replacement trees are applied:

- eight trees for every tree with a diameter at breast height (DBH) greater than 60 cm
- four planted trees for every tree with a DBH of 15 cm – 60 cm
- two trees for every tree with a DBH less than 15 cm.

The total number of trees that would need to be planted would be determined at the detailed design stage. The *Vegetation Offset Guide* would be applied to the Proposal during the development of the Urban Design Landscape Plan (UDLP) to identify any potential to offset within the bounds of the Proposal site. Additional offset vegetation planting would be planted at an alternative site, in consultation with Rockdale City Council.

**(b) Operational phase**

Operational activities at Arncliffe Station are not proposed to significantly change and as a result there would be no increased risk to biodiversity.

### 6.7.3. Mitigation measures

The CEMP would be developed in accordance with the recommendations of the Flora and Fauna Impact Assessment (AMC, 2015) and would include a range of other weed control, tree protection, and erosion and sedimentation control measures. Refer to Table 11 for a list of proposed mitigation measures.

## 6.8. Contamination, landform, geology and soils

A geotechnical investigation was undertaken as part of the development of the concept design (A.D Envirotech (ADE), 2014b) and was carried out in accordance with *AS 1726-1993 Geotechnical Site Investigations* . In addition a Hazardous Material Survey and Risk Assessment was undertaken by ADE (2014a) in accordance with the relevant guidelines including the *NSW Code of Practice: How to Manage and Control Asbestos in the Workplace* (2011) and involved a desktop analysis and site inspection (Greencap, 2014). The findings of these investigations are summarised in this section. A Waste Analysis Report for the site was prepared by ADE (2014c) to inform the concept design development. Waste classification was undertaken in accordance with the NSW EPA *Waste Classification Guidelines Part 1: Classifying Waste for Off-site Disposal* (2009).

### 6.8.1. Existing environment

**Geology and soils**

The landform around the station generally slopes up towards the south while the tracks stay approximately level. As a result, the tracks move from slightly above natural ground at the northern end to a cutting at the southern end.

The natural ground of the Proposal is described on the *NSW Soil Conservation Services Soil Landscapes of Sydney 1:100,000 Sheet,* as being under underlain by Hawkesbury Sandstone Bedrock. A geotechnical investigation of the Proposal (ADE, 2014b) revealed a subsurface profile of fill over sandstone bedrock. The sandstone was found within 2.8-4.8 metres from ground level. The sandstone was overlain with a light brown sandy clay. Point load tests conducted on the recovered core samples showed rock strengths ranging from low to medium strength.

No analysis of ASS was undertaken however the Proposal is mapped as Class 5 ASS in the Rockdale LEP and so is unlikely to contain ASS.

**Contamination**

Investigations were conducted by ADE in September and October 2014 at Arncliffe Railway Station to identify the presence of hazardous materials at the site in the buildings and platform areas and to assess the risk these materials might present to contractors and other persons authorised to use the site. No friable asbestos was detected.

The investigations found the following hazardous material present within station buildings:

- bonded asbestos
- lead-containing paints above 10,000 mg/kg
- lead-containing dust above 1500 mg/kg
- synthetic mineral fibre products
- capacitors with polychlorinated biphenyls (PCBs).

Preliminary soil sampling undertaken at a number of locations at the southern end of the station found:

- at depths greater than 0.9 metres, the soil samples met the NSW EPA criteria for general solid waste.
- at one location to the west of the station, adjacent to the rail boundary with Firth Street, soil samples in the upper fill material met the NSW EPA criteria for hazardous solid waste.

Asbestos was not detected within any of the samples collected from within the Proposal area.

A preliminary search of the OEH Contaminated Land Records was undertaken for the Rockdale LGA on 8 January 2015. One registered contaminated site is located approximately 400 metres north of the Proposal (the Tulloch Australia Facility, 61 Turrella Street, Turrella). Associated contamination impacts are not anticipated given the distance from contaminated sites and the Proposal.

### 6.8.2. Potential impacts

#### (a) Construction phase

The Proposal would require some excavation work for the installation of footings for the lifts, footbridge structures, car park reconfiguration and new footpaths. Other trenching or excavation may be required for the relocation of services or tree removal.

The Burrows Street compound would be used for commuter car parking during construction to replace parking lost by closing the commuter car park. This would require the installation of temporary paving or hardstand material on part of the compound site to provide a suitable, all weather parking area. The temporary car park area would be rehabilitated following completion of the construction works.

Excavation and other earthworks such as trenching can result in erosion and sedimentation if not undertaken with appropriate controls. Such impacts can also lead to an adverse effect on biodiversity such as through the introduction of sediments into waterways. Erosion and sedimentation risks for the Proposal are considered to be low, given the level slope of the area and limited excavation works required. It is expected that erosion could be adequately

managed through the implementation of standard measures as outlined in the *'Blue Book' Managing Urban Stormwater, Soils and Construction* (Landcom, 2004).

In addition, given the past land use and findings of the geotechnical investigation, excavation has the potential to expose contaminants, which if not appropriately managed, can present a health risk to construction workers and the community. Contaminants would also pose an environmental risk if they were to enter nearby waterways through the stormwater infrastructure. As there is potential for onsite contamination, chemical testing and visual characterisation would be undertaken 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 facility.

During construction works, there is also the potential for soil to become contaminated through incidental chemical or fuel spills and leaks from construction plant and equipment.

**(b) Operational phase**

There would be no operational risks to geology and 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/s would be prepared and implemented in accordance with the 'Blue Book' - *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004). The Erosion and Sediment Control Plans would be established prior to the commencement of construction and be updated and managed throughout as relevant to the activities during the construction phase.

A copy of the Hazardous Material Register, contained in the *Hazardous Materials Survey Report* (ADE, 2014a) should be made readily available to all contractors conducting works on the site. Should works be undertaken in any inaccessible areas/voids, or within areas not explicitly listed in the *Hazardous Materials Survey Report* (ADE, 2014a), any suspected asbestos materials should be inspected and sampled by an experienced environmental consultant. Works in the area should be suspended until the results are made available. All hazardous materials identified would be removed prior to the demolition or refurbishment of an area.

As a result of the preliminary contamination investigations within the rail corridor, it is recommended that the upper fill material (0-1.2 metres below top of rail) should be separated from the lower material. Furthermore, material from different locations should be kept separate during excavation works in order to minimise cross contamination. All material excavated from the site would be tested prior to removal in order to appropriately classify the material for offsite disposal. Measures to mitigate potential impacts from any contaminated soil/materials during construction would be developed and implemented through a Waste Management Plan as part of the CEMP. All spoil would be managed in accordance with relevant legislation and the recommendations in the Hazardous Materials Survey Report (ADE, 2014a).

Refer to Table 11 for a list of proposed mitigation measures.

## 6.9. Hydrology and water quality

### 6.9.1. Existing environment

**Surface water and groundwater**

The Proposal site is located within the Bonnie Doon drainage sub catchment which drains the suburb of Arncliffe to the Cooks River via a formalised channel. The catchment area upstream of the station is approximately 0.9 square kilometres, bounded generally by Forest Road to the south, Wolli Creek Road to the west, the T4 Eastern Suburbs and Illawarra railway line to the east and Willington, Knoll and Lusty Streets to the north. There are no natural watercourses present on or near the Proposal site (including compounds), however stormwater drains are likely to be present in the area including on Firth Street, which would drain to the Cooks River and into Botany Bay.

**Flooding**

The Proposal site (including site compounds) is not mapped as flood liable land on Rockdale flood maps.

### 6.9.2. Potential impacts

#### (a) Construction phase

Without appropriate safeguards, pollutants (fuels, chemicals or wastewater from accidental spills, and sediment from excavations and stockpiles) could potentially enter stormwater drains and flow into nearby waterways.

Activities that would disturb soil during construction work would have the potential to impact on local waterways as a result of erosion and sedimentation.

Groundwater levels were not determined as part of this assessment, however areas of excavation may need to be dewatered as a result of groundwater seepage or rainfall runoff. Incorrect dewatering can pose risks to nearby waterways.

#### (b) Operational phase

The Proposal is unlikely to have a major impact on the hydrology of the Proposal site or the surrounding area. T here may be impacts on existing track drainage, and the need for additional drainage pipes to cater for the new canopy drainage which would need to be investigated. The detailed design would take stormwater management into consideration and the Proposal would be designed in accordance with the relevant Sydney Trains, Sydney Water and council standards and requirements.

### 6.9.3. Mitigation measures

As noted in Section 6.8.3, Erosion and Sediment Control Plans would be prepared and implemented for the Proposal to manage risks to water quality. Other mitigation measures that would be required for construction include regular vehicle and equipment maintenance along with spill kits and spill response procedures. Any dewatering would be undertaken in accordance with the Transport for NSW's *Water Discharge and Reuse Guideline (* Transport for NSW, 2013e).

Operational risks associated with localised flooding from an increase to impervious areas from new/widened footpath and new vehicle bay would be addressed during detailed design of the Proposal.

Refer to Table 11 for a list of proposed mitigation measures.

# 6.10. Air quality

## 6.10.1. Existing environment

The Proposal is located in a disturbed environment comprising roads and railway lines, residential areas and light industrial areas. Air quality in the area would therefore be subject to emissions typically associated with train movements and road traffic, including dust and combustion emissions. There are no other major sources of air pollution in the area.

The Rockdale LGA is situated in the lower eastern tract of the Sydney Basin airshed, one kilometre west of Botany Bay, where air quality is largely influenced by the wind regime and nearby industrial sources such as the Sydney Airport, the M5 motorway, the Princes Highway and industrial estates.

Air quality is monitored by OEH at 16 locations throughout the Sydney Basin. The Earlwood air quality monitoring station is located one kilometre to the west of the Proposal, situated in a residential area in the Cook's River valley at an elevation of seven metres.

The Earlwood station monitors five key pollutants: ozone ($O_3$), nitrogen dioxide ($NO_2$) carbon monoxide (CO) sulfur dioxide ($SO_2$) and particulates less than 10 micrometres in diameter ($PM_{10}$), and provides an hourly and daily air quality index. The monitoring results for the month of October 2014 showed air quality levels as being good to fair, with no days reaching poor or hazardous.

## 6.10.2. Potential impacts

### (a) Construction phase

The main air quality impacts that have the potential to occur during construction would be temporary impacts associated with dust particles and emissions of CO, $SO_2$, $PM_{10}$, nitrous oxides, volatile organic compounds (VOC), and polycyclic aromatic hydrocarbons (PAH) compounds associated with the combustion of diesel fuel and petrol from construction plant and equipment

Anticipated sources of dust and dust-generating activities include:

- excavation for the new lifts to access the station platform
- construction of car park extension on eastern side of the station
- stockpiling activities
- dust generated from the loading and transfer of material from trucks
- other general construction works.

The Proposal would have minimal impact on air quality as it would not involve extensive excavation or other land disturbance with the potential to generate significant quantities of dust.

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

### (b) Operational phase

Overall impacts of air quality during the operation of the Proposal are considered minimal as the Proposal would not result in a significant change in land use. Also, as the Proposal would increase access to public transport, the use of public transport would be anticipated to

increase and subsequently aim to reduce the amount of private vehicle related emissions in the long term.

### 6.10.3. Mitigation measures

Table 11 provides a list of mitigation measures that are proposed to manage air quality issues during construction. They are aimed around maintaining and operating plant and equipment efficiently and implementing measures for dust suppression including watering, covered loads and appropriate management of tracked dirt/mud on vehicles. Such measures would be included in the CEMP to be prepared for the Proposal.

## 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.

The Proposal is located close to several underground services as identified in Section 3.2.7. In addition, an upgraded power transformer would be installed adjacent to the existing transformer in order to achieve the additional power supply required for the new lifts. Trenching would be required to provide electricity to the new lifts. This work would be undertaken within the rail corridor.

There is also the potential for the existing 33kV aerial cables (that run along the eastern side of the corridor boundary) to be undergrounded, if required. This would require trenching/installing in galvanised steel troughs. This work would be undertaken within the rail corridor.

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

The construction of the Proposal would generate the following waste:

- asphalt and concrete
- earthworks spoil
- various building material wastes (including metals, timbers, plastics, concrete and carpeting)
- fuels, liquids and chemicals
- general waste, including food and other wastes generated by construction workers.

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 of waste that cannot be reused or recycled at appropriately licensed facilities along with other onsite management practices such as keeping areas free of rubbish.

The application of the *Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a) would also result in waste management targets to be developed for the Proposal and would include reuse and recycling.

## 6.12. Cumulative impacts

### 6.12.1. Existing environment

Cumulative impacts occur when two or more projects are carried out concurrently and in close proximity to one another. The impacts may be caused by both construction and operational activities and can result in a greater impact to the surrounding area than would be expected if each project was undertaken in isolation.

Another type of cumulative impact is known as construction fatigue. This concept relates to sensitive receivers that experience construction impacts from a variety of projects over a long period of time with few or no breaks between construction periods. Construction fatigue typically relates to amenity impacts from projects that are constructed consecutively or 'back to back'.

The following websites/databases were searched for recent or proposed projects near the Proposal site:

- Department of Planning and Environment
- Roads and Maritime Services
- Rockdale City Council
- Transport for NSW.

There are a number of projects proposed and underway in the Rockdale LGA, such as developments in Wolli Creek or in other parts of Arncliffe, however, the Arncliffe Pedestrian Link currently under construction proposed by Transport for NSW is the most relevant to the Proposal due to its close proximity (approximately 300 metres north of the Proposal site) and the expected overlap in the construction stages (and would utilise the same Roads and Maritime Services land off Burrows Street for a construction compound). The Arncliffe Pedestrian Link commenced construction in early 2015, with the Proposal expected commence in mid-2015, subject to approval.

### 6.12.2. Potential impacts

#### (a) Construction phase

*Traffic*

The overlap of construction activities could potentially result in a number of cumulative impacts for users of the road network and those living and working in and around the Proposal site and Burrows Street compound, including:

- increased number of construction related vehicles on Wollongong Road, Allen Street Arncliffe Street, Firth Street and Burrows Street
- the potential for a temporary shift of traffic movements from roads near the Proposal site to alternative routes particularly during peak periods
- temporary and minor disruptions and delays to traffic

A co-ordinated approach to construction traffic management would be implemented between the projects to minimise these cumulative impacts. This would be possible through regular communications between Transport for NSW and the contractors of the projects. Traffic associated with the construction of the Proposal and the Arncliffe Pedestrian Link is not anticipated to have a significant impact on the surrounding road network.

The use of one compound site for both the Arncliffe Pedestrian Link and the Arncliffe Station Upgrade would restrict heavy machinery and vehicles used for both these projects to fewer roads in the local area. This has the potential to put pressure on the compound site access roads and cause deterioration of the road surfaces, particularly along Arncliffe Street and Burrows Street. Mitigation measures would be in place to ensure the roads are repaired as needed and after construction.

*Socio-economic*

While there is some potential for adverse impacts to some businesses during the construction phase, other businesses may experience economic benefits as a result of the construction process. At the broadest level, businesses that are most likely to experience positive impacts during the construction phase are those that service the construction industry including suppliers of construction materials. At a local level, retailers and food and beverage premises near the project sites would be expected to attract increased trade from construction workers.

*Local amenity*

Dust, noise and vibration associated with construction projects have the potential to affect local amenity. It is anticipated that some sensitive receivers near the Proposal site and the Arncliffe Pedestrian Link would experience some impact during construction as a result of disturbances such as dust, noise and vibration from multiple projects.

Sensitive receivers near the Burrows Street compound and those located roughly in the middle of both project sites would experience construction traffic for the duration of the underpass construction and station upgrade. While details of construction activities and staging of works are not yet confirmed, noise emission profiles for the works are expected to remain consistent with those predicted in the Noise and Vibration Impact Assessment. Where construction works are undertaken concurrently, and increase in received noise levels of up to 3 dBA may occur. However sources close to a particular receiver would dominate, with the cumulative influence from short-term or transient activities decreasing at separation distances of 100 metres and beyond.

Regular customers who use Arncliffe Station and reside or visit areas to the north of the Allen Street bridge underpass would come across two construction sites when both projects are being constructed.

During certain weather conditions, it is possible for dust to arise from construction activities in different parts of the local area resulting in cumulative dust impacts on some receivers.

These impacts would be temporary and confined to the construction period and mitigation measures would be implemented to minimise the impacts.

**(b) Operation phase**

*Traffic and transport*

The overall cumulative operational impacts of the Proposal and the Arncliffe Pedestrian Link are expected to be positive for the community. The upgrade of the station would make the

station more accessible to a wider community. Both these projects are expected to encourage locals to walk or use public transport, potentially decreasing the use of cars for smaller journeys.

Operational traffic and transport impacts would have minimal impact on the performance of the surrounding road network.

*Local amenity*

The visual landscape and character of the local area would not change as a result of the Proposal and the Arncliffe Pedestrian Link. While there would be some changes to the visual environment as a result of vegetation removal associated with the Arncliffe Pedestrian Link, the removal of four trees along Firth Street and the removal of one tree from the commuter car park, the overall landscape and character would remain the same.

*Socio-economic*

Improved pedestrian accessibility both across the railway line and to and from the station and improved public transport facilities would result in positive community impacts. Both the projects are likely to increase pedestrian activity locally, potentially increasing trade at local retailers.

### 6.12.3. Mitigation measures

During construction, the works for the Proposal would be coordinated with the Arncliffe Pedestrian Link and any other construction activities in the area with Council, Sydney Trains and Transport for NSW and any other developers identified to minimise cumulative construction impacts such as traffic and noise.

The potential cumulative impacts associated with the Proposal and the Pedestrian Link would be further considered as the designs develop. Environmental management measures would be developed and implemented as appropriate.

## 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.

Due to the small scale of the Proposal and the short term temporary nature of the construction works, it is considered that greenhouse gas emissions resulting from the construction of the Proposal would be minimal. Furthermore, greenhouse gas emissions generated during construction would be kept to a minimum through the implementation of the standard mitigation measures detailed in Table 11.

It is anticipated that, once operational, the Proposal would result in an increase in use of public transport and this shift in transport usage would reduce the amount of fuel consumed by private motor vehicles and would result in a relative reduction in associated greenhouse gas emissions in the local area.

### 6.13.2. Climate change

The dynamic nature of our climate system indicates a need to focus attention on how to adapt to changes in the climate and understand the limitations of adaptation. The effects of climate change 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. Such changes in weather in the region are unlikely to impact on the operation of the Proposal.

Climate change could lead to an increase in frequency and severity of bushfires. The Proposal site is not situated on land mapped as bushfire prone, but would be designed with appropriate fire protection measures.

### 6.13.3. Sustainability

The design of the Proposal would be based on the principles of sustainability, including the *Sustainable Design Guidelines – Version 3.0* (Transport for NSW, 2013a) and Transport for NSW's EMS. These Guidelines would be applied to the detailed design of the Proposal and require a number of mandatory and discretionary initiatives to be applied. Refer to Section 3.1.4 for more information regarding the application of the Guidelines.

Further positive impacts in relation to climate change and sustainability associated with the Proposal include encouraging a reduction in private vehicle use and increasing the accessibility 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 Transport for NSW'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 include at a minimum the following management plans:

- Construction Traffic Management Plan
- Construction Noise and Vibration Management Plan
- Erosion and Sediment Control Plan
- Waste Management Plan.

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 11. These proposed measures would minimise the potential adverse impacts of the Proposal identified in Chapter 6, should the Proposal proceed.

**Table 11: Proposed mitigation measures**

| No | Mitigation measures |
|---|---|
| | **General** |
| 1 | An Environmental Controls Map (ECM) will be developed prior to commencement of construction in accordance with Transport for NSW's draft guide to preparing ECMs. The ECM will be implemented for the duration of construction. |
| 2 | An appropriately qualified and experienced site based environment manager will be appointed prior to the commencement of construction. |
| 3 | A project risk assessment including environmental aspects and impacts will be undertaken prior to the commencement of construction. |
| 4 | Regular inspections to monitor environmental compliance and performance will be undertaken during construction. |
| 5 | Prior to the commencement of construction, all contractors will be inducted on the key project environmental risks, mitigation measures and conditions of approval. |
| | **Traffic and site access** |
| 6 | During detailed design, the number of parking spaces to be removed along Firth Street and within the commuter car park is to be minimised as far as possible. |

| No | Mitigation measures |
|---|---|
| 7 | Road occupancy licences for temporary closure of roads would be obtained, where required. |
| 8 | Traffic management plans would be prepared and provided to the relevant roads authority as required. |
| 9 | Heavy vehicles would be restricted to specified routes, with the aim of avoiding local streets, high pedestrian areas and school zones. Where feasible, route markers would be installed for heavy vehicles along designated routes. |
| 10 | Construction personnel would be encouraged to use public transport and/or limit parking to designated areas to reduce impacts to commuter parking. |
| 11 | The queuing and idling of construction vehicles in residential streets would be minimised. |
| 12 | An emergency response plan would be developed for construction traffic incidents. |
| 13 | During project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents. |
| 14 | Where required, public communications would be conducted to notify the community and local residents of vehicle movements and anticipated effects on the local road network relating to site works in accordance with the CEMP. |
| 15 | Access to all private properties adjacent to the works would be maintained during construction, unless otherwise agreed by relevant property owners. |
| 16 | During project inductions, all heavy vehicle drivers would be provided with the emergency response plan for construction traffic incidents. |
| | **Landscape and visual amenity** |
| 17 | If works encroach within the dripline of any trees, the relevant trees would be protected prior to the commencement of those specific construction activities in accordance with AS 4970-2009, the Australian Standard for *Protection of Trees on Development Sites and Adjoining Properties*. |
| 18 | Minimise light spill from the rail corridor into adjacent visually sensitive properties 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. |
| 19 | Lighting should be designed, operated and installed in accordance with Australian Standard AS1680.1-2006 to minimise light spill into adjacent residential properties. |
| 20 | Where possible, the elements within the construction site would be located to minimise visual impact e.g. materials and machinery would be stored behind fencing. |
| 21 | Consolidate site equipment and facilities to maximise the area of useable public realm and maintain pedestrian permeability. |
| 22 | Work/site compounds would be screened, with shade cloth (or similar material) (where necessary) to minimise visual impacts from identified sensitive visual receivers. |
| 23 | Temporary hoardings, barriers, traffic management and signage would be removed when no longer required. |
| 24 | Schedule haulage works to the Proposal site to avoid peak hours and minimise after hours works. |
| 25 | Graffiti on the construction site (e.g. on hoardings) would be removed in accordance with Transport for NSW's standard requirements. |
| 26 | A reduction in the scale of the station identification signage to minimise any adverse visual impact should be investigated during detailed design. |

| No | Mitigation measures |
|---|---|
| 27 | The detailed design of the western station entry forecourt area should ensure planting and street furnishings complement the character of the surrounding streetscape and station heritage architecture and do not create any undue visual clutter. |
| 28 | The use of highly reflective surfaces should be minimised with a preference for the use of a muted, less intrusive colour palette. |
| | **Noise and vibration** |
| 29 | 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 Strategy* (Transport for NSW, 2012b) and the Noise and Vibration Impact Assessment for the Proposal (Ausenco, 2015). The CNVMP would take into consideration measures for reducing the source noise levels of construction equipment by construction planning and equipment selection where practicable. |
| 30 | Works would generally be carried out during normal work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). An Out of Hours Work approval would need to be obtained from Transport for NSW by the Contractor for all Out of Hours Work. |
| 31 | To reduce the construction noise impact from human activities, reasonable and feasible noise mitigation options should be considered, including:<br>• Regularly training workers and contractors (such as at toolbox talks) on the importance of minimising noise emissions and how to use equipment in ways to minimise noise.<br>• Using only the equipment necessary for the upgrade works at any one time.<br>• Avoiding any unnecessary noise when carrying out manual operations and when operating plant.<br>• Ensuring spoil is placed and not dropped into awaiting trucks.<br>• Avoiding/limiting simultaneous operation of noisy plant and equipment within discernible range of a sensitive receiver where possible.<br>• Switching off any equipment not in use for extended periods e.g. heavy vehicles engines should be switched off whilst being unloaded.<br>• Avoiding deliveries at night/evenings wherever possible.<br>• No idling of delivery trucks.<br>• Keeping truck drivers informed of designated vehicle routes, parking locations and acceptable delivery hours for the site.<br>• Minimising talking loudly; no swearing or unnecessary shouting, or loud stereos/radios onsite. No dropping of materials from height where practicable, throwing of metal items and slamming of doors. |
| 32 | To reduce the construction noise and vibration impacts from mechanical activities, reasonable and feasible noise mitigation options should be considered, including:<br>• Maximising the offset distance between noisy plant and adjacent sensitive receivers and determining safe working distances.<br>• Directing noise-emitting plant away from sensitive receivers.<br>• Regularly inspecting and maintaining plant to avoid increased noise levels from rattling hatches, loose fittings etc.<br>• 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).<br>• Fitting mufflers/silencers to pneumatic tools (e.g. breakers) and use residential-grade mufflers on plant. |

| No | Mitigation measures |
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| | • Use of quieter and less vibration emitting construction methods where feasible and reasonable. |
| 33 | Work would be conducted behind temporary hoardings/screens wherever practicable. The installation of construction hoarding should take into consideration the location of residential receivers to ensure that 'line of sight' is broken, where feasible. |
| 34 | The use of respite periods would be considered where feasible for works in the vicinity of receivers likely to be highly noise affected (e.g. childcare centre). |
| 35 | Where reasonable and feasible, noise intensive works outside of core hours (such as during school time for any education facilities, periods of congregation for any places of worship, or quiet time at childcare centres) would be minimised. The characteristic activities for non-residential properties should not be unduly disturbed. The proponent should consult with noise sensitive land use occupants likely to be affected by noise from the works to schedule work hours to achieve a reasonable noise outcome. |
| 36 | To effectively mitigate potential impacts of vibration on buildings/structures, activities that cause vibration would be managed in accordance with German Standard DIN 4150 - Part 3 (DIN, 1999) and must also include consideration of the heritage specification for works in proximity to heritage buildings (i.e. attended vibration monitoring or trials when works are to be undertaken within safe working distances). |
| 37 | Vibration monitoring loggers would be installed within 1m of heritage structures, and configured to provide SMS phone notification (or similar) to project personnel when determined trigger levels are close to being exceeded. If vibration levels exceed the determined trigger level, then construction activity would cease and the heritage structure would be assessed before construction recommences. |
| 38 | Building condition surveys would also be completed both before and after the works at all potentially affected properties to identify existing damage and any Proposal related damage. |
| 39 | Noise monitoring would be conducted during the out of hours work at the representative affected residences in accordance with Transport for NSW's *Construction Noise Strategy* and the results used to identify appropriate additional mitigation measures as required. |
| 40 | Compliance monitoring would be undertaken during construction to verify the received level of noise at selected noise sensitive receivers such as the childcare centre. |
| | **Indigenous heritage** |
| 41 | All construction staff would receive basic training in the recognition of Aboriginal cultural heritage material. This training would include information such as the importance of Aboriginal cultural heritage material and places to both the Aboriginal and non-Aboriginal community, as well as the legal implications of removal, disturbance and damage to any Aboriginal cultural heritage material and sites. |
| 42 | If Aboriginal objects are located during works, all works must stop in the vicinity of the find, and the NSW Office of Environment and Heritage, LALC and an archaeologist would be notified. Where required, further archaeological investigations and an Aboriginal Heritage Impact Permit would be obtained before works recommence. |
| 43 | If the project design is changed, and areas not surveyed are to be impacted, further archaeological assessment would be undertaken. Should any indigenous heritage items be found, they would be identified on the construction contractor's environmental controls. |
| | **Non-indigenous heritage** |
| 44 | A section 60 approval under the *Heritage Act 1977* would be obtained from the NSW |

| No | Mitigation measures |
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| | Heritage Council prior to works commencing. |
| 45 | Rockdale City Council would be notified under section 14 of the Infrastructure SEPP (as proposed works are in the vicinity of locally listed heritage items). |
| 46 | A suitably qualified and experienced heritage architect will be engaged to provide input to, and review of, the detailed design of the Proposal. Modifications to the scope of works should be undertaken in consultation with the engaged heritage consultant to ensure that works may proceed in accordance with heritage best practice and the Section 60 Approval. |
| 47 | A Heritage Management Plan (including detailed drawings, documentation and specifications) and Work Method Statement would be prepared as part of the Construction Environmental Management Plan (CEMP) to address heritage impacts and required management procedures to minimise risks. |
| 48 | Signage informing the local community of the Proposal, the heritage value of the station precinct and the outcomes of the Proposal should be located adjacent to station entries during the construction phase. |
| 49 | A Heritage Interpretive Strategy would be developed in accordance with the Heritage Interpretation Policy (Heritage Council of NSW, 2005). Simple heritage interpretation signage would be incorporated into the design of the footbridge via the integration of photos or text into the footbridge paving, or along wall sections. (In this case, a minimum of 2 x AO/A1 panels are to be installed). |
| 50 | A no-go zone including physical barriers would be established around the heritage trees on Firth Street (south of the proposed works) and no parking or storage of materials within the drip zone would be permitted. |
| 51 | Removal of up to four Cypress pines in Firth Street and pruning/lifting the crowns of the remaining trees would be undertaken by a qualified arborist to ensure impact on the trees is minimised. |
| 52 | The Contractor would provide a heritage induction to all relevant staff, contractors and subcontractors before construction begins, informing them of the location of known heritage items and guidelines to follow if unanticipated heritage items or deposits are located during construction. This would include training on their statutory obligations for heritage under the *Heritage Act 1977* and best practice outlined in the Burra Charter (2013), and a handout including a colour-coded plan clearly identifying the SHR curtilage, sensitive and no-go areas |
| 53 | Archival recording would be undertaken of the Station Footbridge, Concourse and Overhead Booking Office in accordance with relevant NSW heritage guidelines. The archival recording should contain the following:<br>▪ an Archival Record in accordance with: *How to Prepare Archival Records of Heritage Items* (NSW Heritage Office 1998) and *Photographic Recording of Heritage Items Using Film or Digital Capture* (NSW Heritage Office 2006). In addition, internal and external scanning of the station building is to be undertaken with a 3D laser device, in a suitable electronic data format (i.e. CAD software or equivalent)<br>▪ this recording is to be lodged with the NSW Heritage Division for future reference |
| 54 | The final design would be sympathetic to the original design of the heritage building, through its form, scale and materiality. The materials and colour palette for the lifts, supporting structure, and family accessible toilets would be sympathetic to the heritage context of the railway station, and be visually recessive. The use of unobtrusive, modern, light materials, such as glass panelling and slim frame elements would reduce the bulk of the Proposal, reducing the visual impact of the additional items.<br>▪ the deflection wall is to be set apart from the existing brick pier, and the colour of the wall will interpret the colour and shade of the adjoining pier. |

| No | Mitigation measures |
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| 55 | Other minor works to the existing buildings would be undertaken, as follows:<br>▪ removal of the external security bars and metal screens from significant windows to the three buildings and make good while installing perforated stainless steel mesh screens on windows requiring security<br>▪ removal of the unsympathetic attachments including window mounted air-conditioners, surface mounted conduit and redundant services from the significant external walls of the four platform buildings<br>▪ replacement of any acrylic glazing with glass panes to significant external windows on the four platform buildings<br>▪ relocation of the vending machines which adjoin the four significant buildings to locations which do not abut or obstruct views to and from the significant external walls of the four buildings. |
| 56 | Competent direction and supervision would be maintained at all stages and any changes to heritage elements would be implemented by people with appropriate qualifications, knowledge and skills. |
| 57 | Canopies and light poles should be designed to give the appearance of being light-weight while maintaining appropriate levels of structural strength. |
| 58 | When erecting the canopy and screen supporting structure at the footbridge, the heritage fabric would be protected from damage through implementation of a suitable protective medium. |
| 59 | Where platform re-grading, installation of canopies or light poles, or installation of construction compounds, is required adjacent to heritage elements, the fabric of the station building would be protected via a geo-textile fabric or similar. Adequate measures would be taken to protect existing steps, posts, door jambs and weatherboard panels from direct contact with any new surface materials. |
| 60 | The removed sections of balustrades on the footbridge are to be re-used on the footbridge, if they meet appropriate standards. Otherwise, investigation into their re-use in the precinct is to be investigated. |
| 61 | Upgrade of existing toilets should retain as much as practicable of the original fabric of the building, and internal features would be retained in situ where possible. Consideration should be given to retaining sections of internal and external screens and partitions where possible, in consultation with the engaged heritage consultant. New partitions would be constructed in lightweight construction as reversible construction to minimise their impact on original fabric. New partitions should not make contact with original ceilings so as to retain the significant ceilings and cornice intact. Any ceiling services are to be suspended/limited to avoid penetrations into the ceiling, and service penetrations into external walls are to be minimised. |
| 62 | Any impacts to the finishes to the heritage buildings would be treated in a similar colour and finish to the existing (with the exception of the booking office cladding), and any new fixtures (electrical or plumbing conduits) are to be sympathetically attached to the walls with minimal impact to original fabric (i.e. colour and fixings). |
| 63 | Refurbishment of the overhead booking office should be sympathetic with the original fabric, albeit in modern materials. Traditional rusticated weatherboards if in situ beneath the fibro sheet cladding, should be re-instated, or may be reflected in HardiPlank equivalents, provided the rusticated/with gutter profile is replicated. The original colour scheme should be historically researched and reinstated if feasible. Otherwise, the booking office is to be painted a light traditional Cream colour to enhance the aesthetic significance of the building. The ticketing window should be retained in location and scale. Any upgrade to the floor of the concourse would be determined in cooperation with the engaged heritage consultant. |

| No | Mitigation measures |
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| 64 | The final overall colour scheme for the station is yet to be determined; however, consideration should be given to a restricted use of colour. The combination of multiple colours would detract from the aesthetic heritage values of the station precinct and should be avoided. Consultation with the design team and Transport for NSW should determine an appropriate limited colour scheme, in particular for the glazing and other elements that are appropriate to the current colour scheme and heritage values of the station. Preference should be given to neutral or recessive colours and pale grey glazing. |
| 65 | Anti-throw screens should be as light-weight and low-scale as safety provisions permit to minimise the visual impacts on the station. Where feasible, overall heights of anti-throw screens should be reduced to minimise impacts on the aesthetic significance of the station precinct.<br>Consideration should be given to integrating interpretative imagery relevant to the station's or local area's history into the patterning of the anti-throw screens to minimise the impact of the screens. |
| 66 | New awnings would be readily identifiable and are not to be attached to the original fabric of any station buildings. At a minimum, a short gap should be retained between old and new fabric on the platforms. The footbridge canopy would utilise glass paned roofing at the junction with the booking office. The colour/tinting of any glazing is to be determined. |
| 67 | Consideration should be given to adapting an unused room in one of the platform buildings as the Communications Room. Adaptive re-use of station buildings, spaces and rooms for station infrastructure is in accordance with Burra Charter principles and the Arncliffe Station Conservation Management Plan (CMP). The process of adaptation should be subject to meeting relevant codes and standards, and with regard to the potential impacts on the building. The process of adaptation, if feasible, should be in consultation with the engaged heritage consultant. |
| 68 | To effectively mitigate potential impacts of vibration on the Arncliffe Station footbridge or heritage platform buildings, activities that cause vibration would be managed in accordance with German Standard DIN 4150 – Part 3 (DIN 1999) heritage specifications. |
| 69 | If previously unidentified Indigenous or non-Indigenous heritage/archaeological items are uncovered during the works, all works must cease in the vicinity of the material/find and professional advice is to be immediately sought. Works in the vicinity of the find must not re-commence until clearance has been received from OEH and/or Transport for NSW. |
| 70 | Wayfinding signage design to be further assessed and designed and installed in cooperation with the engaged heritage consultant. |
| 71 | On completion of works, an update should be prepared for the State Heritage Register, with required details. |
| | **Biodiversity** |
| 72 | All workers would be provided with an environmental induction prior to commencing work on-site. This induction would include information on the ecological values of the site, protection measures to be implemented to protect biodiversity and penalties for breaches. This includes informing the construction workers about the presence of the Narrow-leaved Black Peppermint tree on the compound site and the presence of heritage trees to the south of the station entrance on Firth Street. |
| 73 | Disturbance of vegetation would be limited to the minimum amount necessary to construct the Proposal. |
| 74 | Weed control measures would be developed to manage the dispersal and establishment of weeds during the construction phase of the project. This would include the management and disposal of the noxious weed *Lantana camara*, in accordance with the *Noxious Weeds Act 1993*. |
| 75 | Vehicles and other equipment to be used on site would be cleaned to minimise seeds and |

| No | Mitigation measures |
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| | plant material entering the site to prevent the introduction of exotic plant species. |
| 76 | The clearing of mature, native trees would be minimised as far as practicable. |
| 77 | Prior to clearing vegetation and during detailed design of the Proposal, consideration should be given to potentially reducing the number of trees to be removed. Any tree removal should be undertaken in consultation with Rockdale City Council. |
| 78 | Removal of the Cypress pines and pruning/lifting the crowns of the remaining Cypress trees on Firth should be undertaken by a qualified arborist to ensure impact on the trees is minimised. |
| 79 | Tree protection should be in line with Australian Standard AS4970-2009 Protection of Trees on Development Sites and should include exclusion fencing of Tree Protection Zones (TPZs). |
| 80 | There would be no pedestrian or vehicle access to TPZs. No construction activities would take place within the TPZ, including storage or stockpiling. Toolbox talks would inform workers of these zones and the restrictions applied. |
| 81 | The trees to be removed would be clearly demarcated on site prior to construction to avoid unnecessary tree removal. Trees to be retained would be protected through temporary protection measures discussed above. |
| 82 | In the event of any tree to be retained becoming damaged during construction, an arborist would be informed immediately to inspect and provide advice on remedial action where possible. |
| 83 | Offsets and landscaping would be undertaken in accordance with Transport for NSW's Vegetation Offset Guidelines. Detailed design would see the landscape plan include provision of as much native vegetation within the Proposal as is feasible. Remaining vegetation to be offset would be undertaken in consultation with Rockdale City Council. |
| 84 | The design and layout of the compound site will take into consideration the existing trees, including the threatened species Narrow-leaved Black Peppermint. This tree would be protected and not removed. |
| 85 | TPZs would be maintained around the trees present within the compound site. |
| | **Soils and water quality** |
| 86 | As part of the CEMP, a site-specific erosion and sediment controls plan/s would be prepared and implemented in accordance with the 'Blue Book' - *Managing Urban Stormwater: Soils and Construction Guidelines* (Landcom, 2004) and Volume 2D (DECC, 2008). The erosion and sediment control plans would be established prior to the commencement of construction and be updated and managed throughout as relevant to the activities during the construction phase.<br>Erosion and sediment control measures would be regularly inspected (particularly following rainfall events) to ensure their ongoing functionality.<br>Erosion and sediment control measures would be left in place until the works are complete and areas are stabilised. |
| 87 | Sediment would be prevented from moving off-site and sediment laden water prevented from entering any watercourse, drainage line or drainage inlet. |
| 88 | Site offices and staff facilities would be located above the 100-year ARI flood level, where practicable. |
| 89 | No stockpiles of materials or storage of fuels or chemicals would be located within high/medium flood risk areas or adjacent to existing culverts. |
| 90 | Vehicles and machinery would be properly maintained to minimise the risk of fuel/oil leaks. |
| 91 | Routine inspections of all construction vehicles and equipment would be undertaken for |

| No | Mitigation measures |
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| | evidence of fuel/oil leaks. |
| 92 | All fuels, chemicals and hazardous liquids would be stored within an impervious bunded area in accordance with Australian Standards and EPA Guidelines. |
| 93 | Emergency spill kits would be kept on-site at all times. All staff would be made aware of the location of the spill kit and be trained in its use. |
| 94 | Construction plant, vehicles and equipment would be refuelled off-site, or in a designated re-fuelling area. |
| 95 | The existing Sydney Trains and Council drainage systems would remain operational throughout the construction of the project. |
| 96 | Groundwater encountered during the construction of the project would be managed in accordance with the requirements of the Waste Classification Guidelines (DECCW 2009) and Transport for NSW's Water Discharge and Reuse Guideline. |
| 97 | Procedures for handling asbestos contaminated materials, including licensed contractor involvement as required, record keeping, site personnel awareness and waste disposal would be undertaken in accordance with WorkCover requirements and documented in the CEMP. |
| 98 | A copy of the Hazardous Material Register, contained in the Hazardous Materials Survey Report (ADE, 2014a) would be made readily available to all contractors conducting works on the site. |
| 99 | Should works be undertaken in any inaccessible areas/voids, or within areas not explicitly listed in the Hazardous Materials Survey Report (ADE, 2014a), any suspected asbestos materials would be inspected and sampled by an experienced environmental consultant. Works in the area would be suspended until the results are made available. |
| 100 | All hazardous materials identified would be removed prior to the demolition or refurbishment of an area. |
| 101 | The upper fill material (0-1.2 metres below top of rail) should be separated from the lower material. Fill material and other excavated material from different locations should be kept separate during excavation works in order to minimise cross contamination. All material excavated from the site would be tested prior to removal in order to appropriately classify the material for offsite disposal. Measures to mitigate potential impacts from any contaminated soil/materials during construction would be developed and implemented through a Waste Management Plan as part of the CEMP. All spoil would be managed in accordance with relevant legislation and the recommendations in the Hazardous Materials Survey Report (ADE, 2014a). |
| | **Air quality** |
| 102 | Activities with the potential to cause substantial emissions such as material delivery and load out and bulk earthworks would be identified in the CEMP. Work practices which minimise emissions during these activities would be investigated and applied where reasonable and feasible. |
| 103 | Methods for management of emissions would be incorporated into project inductions, training and pre-start talks. |
| 104 | Dust would be visually monitored and where necessary the following measures would be implemented:<br>▪ Apply water (or alternate measures) to exposed surfaces that are causing dust generation. Surfaces may include unpaved roads, stockpiles, hardstand areas and other exposed surfaces (for example recently graded areas).<br>▪ Appropriately cover loads on trucks transporting material to and from the construction site. Securely fix tailgates of road transport trucks prior to loading and immediately |

| No | Mitigation measures |
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| | after unloading.<br>▪ Prevent where possible, or remove, mud and dirt being tracked onto sealed road surfaces. |
| 105 | Ensure plant and machinery is regularly checked and maintained in a proper and efficient condition. This would reduce the likelihood of exceeding relevant emissions standards. |
| | **Waste** |
| 106 | The principles of the WARR Act would be adopted as part of the Proposal and documented in the CEMP. |
| 107 | Working areas would be maintained, kept free of rubbish and cleaned up at the end of each working day. |
| | **Climate change and sustainability** |
| 108 | The detailed design process would undertake a AS14064-2 (Greenhouse Gases - project level) compliant carbon footprinting exercise in accordance with Transport for NSW's 'Greenhouse Gas Inventory Guide for Construction Projects'. The carbon footprint would be used to inform decision making in design and construction. |
| 109 | The detailed design process would undertake a climate change impact assessment with reference to the Climate Change Impacts and Risk Management: A Guide for Business and Government and the ISCA Guidelines for Climate Change Adaptation to determine the hazards/risks associated with future climatic conditions. Issues including protecting customers and electrical equipment from wind and rain during storm events, size of guttering, cross flow ventilation, reflective surfaces etc would be considered in the design. |
| 110 | The detailed design process would be undertaken with reference to the Transport for NSW's *Sustainable Design Guidelines – Version 3.0* with a view to obtaining a Silver rating or better. |
| 111 | Waste material would not to be left on site once the works have been completed. |
| | **Cumulative impacts** |
| 112 | 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. |
| 113 | Broad consultation would be undertaken with potentially affected local community and key stakeholders in coordination with proponents of nearby projects. |
| 114 | Consultation would be undertaken with proponents of other nearby projects to increase the overall awareness of project timeframes/staging and impacts and to provide a more coordinated approach to managing construction in the area. |
| | **Community engagement** |
| 115 | Newsletters and other communication tools would be distributed to keep the community informed of construction progress, activities and impacts. This would especially outline the need to undertake work outside standard hours and the process for the community to register complaints in relation to the works. |

# 8. Conclusion

This REF has been prepared in accordance with the provisions of section 111 of the EP&A Act, taking into account to the fullest extent possible, all matters affecting or likely to affect the environment as a result of the Proposal.

The Proposal would provide the following benefits:

- improved accessibility for customers to Arncliffe Station – including the provision of an accessible route for the mobility impaired to station platforms
- improved transport interchange facilities including new vehicle bay for bus stop and taxi/kiss and ride area on the western side of the station; bicycle racks installed on both sides of the station and new accessible parking at the commuter car park
- improved customer amenity and facilities at the station, including two new family accessible toilets and canopies for weather protection
- conservation of State-heritage listed buildings and structures
- support increased use of public transport to and from Arncliffe.

The likely key impacts of the Proposal are as follows:

- temporary noise and vibration impacts during construction
- temporary changes to vehicle and pedestrian movements to access the station and car parks during construction
- temporary disruptions to station facilities and amenities during construction
- small reduction in parking around the station
- impacts to heritage-listed items (footbridge, platform buildings, stairs)
- removal of trees that would require planting offsets
- introduction of new elements, such as canopies and lifts, into the visual environment.

This REF has considered and assessed these impacts in accordance with clause 228 of the EP&A Regulation and the requirements of the EPBC Act (refer to Chapter 7, and Appendices 1 and 2). 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

ADE Consulting. 2014a. *Hazardous Materials Survey Report - Arncliffe Railway Station, Burrows Street, Arncliffe*. Report prepared for North Strathfield Rail Underpass Alliance. Sydney.

ADE Consulting. 2014b. *Geotechnical Investigation - Arncliffe Station, Arncliffe.* Report prepared for North Strathfield Rail Underpass Alliance. Sydney.

ADE Consulting. 2014c. *Waste Analysis Report - Arncliffe Station, Arncliffe*. Report prepared for North Strathfield Rail Underpass Alliance. Sydney.

Australian Museum Consulting. 2015. *Arncliffe Station Upgrade. Statement of Heritage Impact*. Australian Museum Consulting. Sydney.

Ausenco. 2014. Ar*ncliffe Station Upgrade Noise and Vibration Impact Assessment.* Ausenco. Sydney.

Ausenco. 2014b. *Arncliffe Pedestrian Link Noise and Vibration Impact Assessment*. Ausenco. Sydney.

AWC. 2014. *Arncliffe Station Upgrade - Flora and Fauna Assessment*. Australian Wetland Consulting. Byron Bay.

Bayerisches Landesamt für Umwelt. 2007. *Parking Area Noise.*

David Scobie Architects. 2014. A*rncliffe Station Upgrade Preliminary Concept Design Heritage Impact Assessment*.

DEC. 2006. *Assessing Vibration: A Technical Guideline*. Department of Environment and Conservation. Sydney.

DECC. 2009a. *Interim Construction Noise Guideline.* Department of Environment and Climate Change. Sydney.

DECC. 2009b. *Duty to Report Contamination under the Contaminated Land Management Act 1997.* Department of Environment and Climate Change. Sydney.

DECCW. 2009. *Waste Classification Guidelines.* Department of Environment, Climate Change and Water. Sydney.

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

Department of Planning. 2010. *Metropolitan Plan for Sydney 2036.* Department of Planning. Sydney.

Department of Planning and Environment. 2014. *A Plan for Growing Sydney.* Department of Planning and Environment. Sydney.

Department of Planning and Infrastructure. 2013. *Draft Metropolitan Strategy for Sydney 2031.* Department of Planning and Infrastructure. Sydney.

Department of Premier and Cabinet. 2011. *NSW 2021 – A Plan to Make NSW Number One.* Department of Premier and Cabinet. Sydney.

Gennaoui Consulting. 2004. *Pedestrian Safety, Access and Mobility Plan*. Report prepared for Rockdale City Council. Sydney.

EPA. 2000. *NSW Industrial Noise Policy.* NSW Environment Protection Authority. Sydney.

Heritage Council of NSW. 2005. *Heritage Interpretation Strategy*.

Iris Visual Planning & Design. 2014. *Arncliffe Station Easy Access Upgrade Visual Impact Assessment*. Prepared for Transport for NSW. Sydney.

Landcom. 2004. *Managing Urban Stormwater: Soils and Construction, Volume 1, Fourth Edition.* Landcom, Sydney.

Ministry of Transport. 2008. *Guidelines for the Development of Public Transport* Interchange Facilities. Ministry of Transport. Sydney.

NSW Government. 2014. *Rebuilding NSW - State Infrastructure Strategy 2014.* NSW Government. Sydney.

NSW Heritage Office. 1996. *NSW Heritage Manual.* NSW Heritage Office. Sydney.

NSW Heritage Office. 1998. *How to Prepare Archival Records of Heritage Item*. NSW Heritage Office. Sydney.

OEH. 2011. *Guidelines for Consultants Reporting on Contaminated Sites.* Office of Environment and Heritage. Sydney.

Rockdale City Council. 2010. *Rockdale City Urban Strategy.* Rockdale City Council. Sydney.

Rockdale City Council. 2014. *Draft Rockdale Biodiversity Strategy 2014*. Rockdale City Council. Sydney.

SKM. 2013. *Arncliffe Station Precinct Accessibility Upgrade Concept Plans Draft Report, report* prepared for Transport for NSW. SKM. Sydney.

SMEC. 2015. *Arncliffe Station Upgrade. Final Concept Design*. Prepared for NSRU and Transport for NSW, Sydney.

Transport for NSW. 2012a. *NSW Long Term Transport Master Plan*. Transport for NSW, Sydney.

Transport for NSW. 2012b. *Construction Noise Strategy.* Transport for NSW. Sydney.

Transport for NSW. 2012c. *Disability Action Plan 2012-17.* Transport for NSW. Sydney.

Transport for NSW. 2013a. *Sustainable Design Guidelines - Version 3.0*. Transport for NSW. Sydney.

Transport for NSW. 2013b. *Sydney's Walking Future.* Transport for NSW. Sydney.

Transport for NSW. 2013c. *Sydney's Cycling Future.* Transport for NSW. Sydney.

Transport for NSW. 2013d. *Vegetation Offset Guide.* Transport for NSW. Sydney.

Transport for NSW. 2013e. *Water Discharge and Reuse Guideline.* Transport for NSW. Sydney.

# Appendix 1 – Consideration of matters of National Environmental Significance

The table below demonstrates Transport for NSW'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.

| Factor | Impacts |
|---|---|
| **Any impact on a World Heritage property?**<br>No World Heritage properties occur within a five kilometre radius of the site. | nil |
| **Any impact on a National Heritage place?**<br>No National Heritage properties occur within a five kilometre radius of the site. | nil |
| **Any impact on a wetland of international importance?**<br>One wetland of International Significance occurs within a 5km radius of the site (Towra Point Nature Reserve). The Proposal would not have any impacts on this wetland. | nil |
| **Any impact on a listed threatened species or communities?**<br>An Assessment of Significance has been prepared for the Narrow-leaved Black Peppermint (which occurs in the Burros Street compound area but that would not be removed as part of the works) and the Grey-headed Flying Fox. The assessment concluded that the Proposal would not result in significant impact to either threatened species. | nil |
| **Any impacts on listed migratory species?**<br>Removal of vegetation for the proposal would have a negligible impact on listed migratory species in the locality. | nil |
| **Does the Proposal involve a nuclear action (including uranium mining)?**<br>The Proposal does not involve a nuclear action. | nil |
| **Any impact on a Commonwealth marine area?**<br>No Commonwealth marine area occurs within five kilometres of the site. | nil |
| **Does the Proposal involve development of coal seam gas and/or large coal mine that has the potential to impact on water resources?**<br>The Proposal is for a transport facility and is not related to coal seam gas or mining. | nil |
| **Additionally, any impact (direct or indirect) on Commonwealth land?**<br>The Proposal would not be undertaken on or near any Commonwealth land. | nil |

# Appendix 2 – Consideration of clause 228

The table below demonstrates Transport for NSW'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.

| Factor | Impacts |
|---|---|
| **(a) Any environmental impact on a community?**<br>Comment: Some short-term impacts would be anticipated during construction, particularly in relation to heritage, noise, traffic and pedestrian access and visual impacts.<br>Mitigation measures outlined in Table 11 would be implemented to manage and minimise any adverse impacts.<br>There would be positive long-term impacts resulting from improved amenities and increased access for commuters. | minor |
| **(b) Any transformation of a locality?**<br>Comment: The Proposal would impact the locality visually, but the visual character and functions would be retained. The locality surrounding the station would be impacted in a positive manner by providing a community focal point, improving place-making and providing legibility for the interchange functions. | nil |
| **(c) Any environmental impact on the ecosystem of the locality?**<br>Comment: With the proposed mitigation measures in place, the Proposal is unlikely to impact the local ecosystem as confirmed in Chapter 6. Some tree removal would be required but such impacts are not expected to adversely affect any local ecosystems. | nil |
| **(d) Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?**<br>Comment: Some short-term impacts are anticipated during construction, particularly in relation to noise and visual impacts.<br>During operation the Proposal would have some impact to the visual amenity of the station and local area but would have positive safety and access outcomes. These include the introduction of accessible entry and exit to the station, accessible parking, formalised kiss and ride, new bus and taxi zone and shelter, bicycle racks and weather shelters on the platforms. | minor |
| **(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?**<br>Comment: The Proposal would have a positive effect on place-making and is designed to be sympathetic to the existing heritage items. The impacts on the heritage buildings and structures have been minimised. The Proposal would ensure that the station can continue to function with its heritage values in context. The new features would provide improved and more equitable amenity for all train users. Overall, effects are positive. | minor |
| **(f) Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act 1974*)?**<br>Comment: The Proposal is unlikely to have any impact on the habitat of protected fauna. | nil |

| Factor | Impacts |
|---|---|
| **(g) Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?**<br>Comment: The Proposal is unlikely to have an impact on endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air. | nil |
| **(h) Any long-term effects on the environment?**<br>Comment: The overall impact of the proposed upgrade of Arncliffe Station to native flora and fauna is considered to be low. It is unlikely that the proposed works would result in a significant impact to threatened species, populations or communities.<br>There would be a change to the visual environment with the introduction of the new lift structures and shelters, however the choice of materials and finishes and landscaping would mitigate impacts. | nil |
| **(i) Any degradation of the quality of the environment?**<br>Comment: The Proposal is unlikely to have any degradation of the quality of the environment. | minor |
| **(j) Any risk to the safety of the environment?**<br>Comment: Construction of the Proposal would be managed in accordance with a CEMP to reduce any risks to the environment. | minor |
| **(k) Any reduction in the range of beneficial uses of the environment?**<br>Comment: Local users would be impacted by temporary changed access arrangements during construction. A Traffic Management Plan would be developed as part of the CEMP to manage traffic and access issues.<br>During operation, the Proposal is unlikely to have any reduction in the range of beneficial uses of the environment and would improve access to the station and across the railway line for the benefit of all users, including those who were previously excluded from using the footbridge. | minor |
| **(l) Any pollution of the environment?**<br>Comment: There is potential for some short-term noise, air soil and water pollution during construction of the Proposal. These would be managed through the mitigation measures in Table 11.<br>During operation, the Proposal is unlikely to cause any pollution to the environment. | minor |
| **(m) Any environmental problems associated with the disposal of waste?**<br>Comment: The Proposal is unlikely to cause any environmental problems associated with the disposal of waste.<br>All waste would be managed and disposed of in accordance with the OEH Waste Classification Guidelines (2009). Mitigation measures would be implemented to ensure waste is reduced, recycled or reused where applicable | nil |
| **(n) Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?**<br>Comment: The Proposal is unlikely to have any increased demands on limited resources. | nil |
| **(o) Any cumulative environmental effect with other existing or likely future activities?**<br>Comment: Cumulative effects of the Proposal are described in Chapter 6 and includes a discussion of the construction of Arncliffe Pedestrian Link | nil |

| Factor | Impacts |
|---|---|
| which may be undertaken at a similar time. Where feasible, environmental management measures would be coordinated to reduce cumulative construction impacts. The Proposal is unlikely to have any significant long term cumulative impacts. | |
| **(p) Any impact on coastal processes and coastal hazards, including those under projected climate change conditions.**<br>Comment: The Proposal is not located on the coastline and has not been identified as within an area that would be subjected to increased sea level rise. | nil |